

COAL AGE

NOVEMBER, 1960

**Outlook: Coal vs Natural Gas . . .
Rugged competition, then an
alliance between coal and gas
to serve pipelines? p 74**

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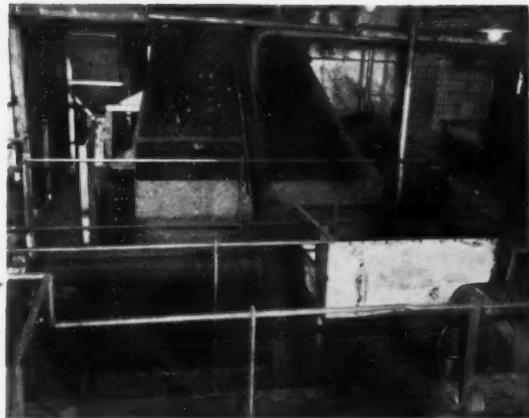
▲ Fine Coal Dredging in Pennsylvania

Excellent power fuel taken from strip-mine lake . . . p 86



◀ Deep Mining in Virginia

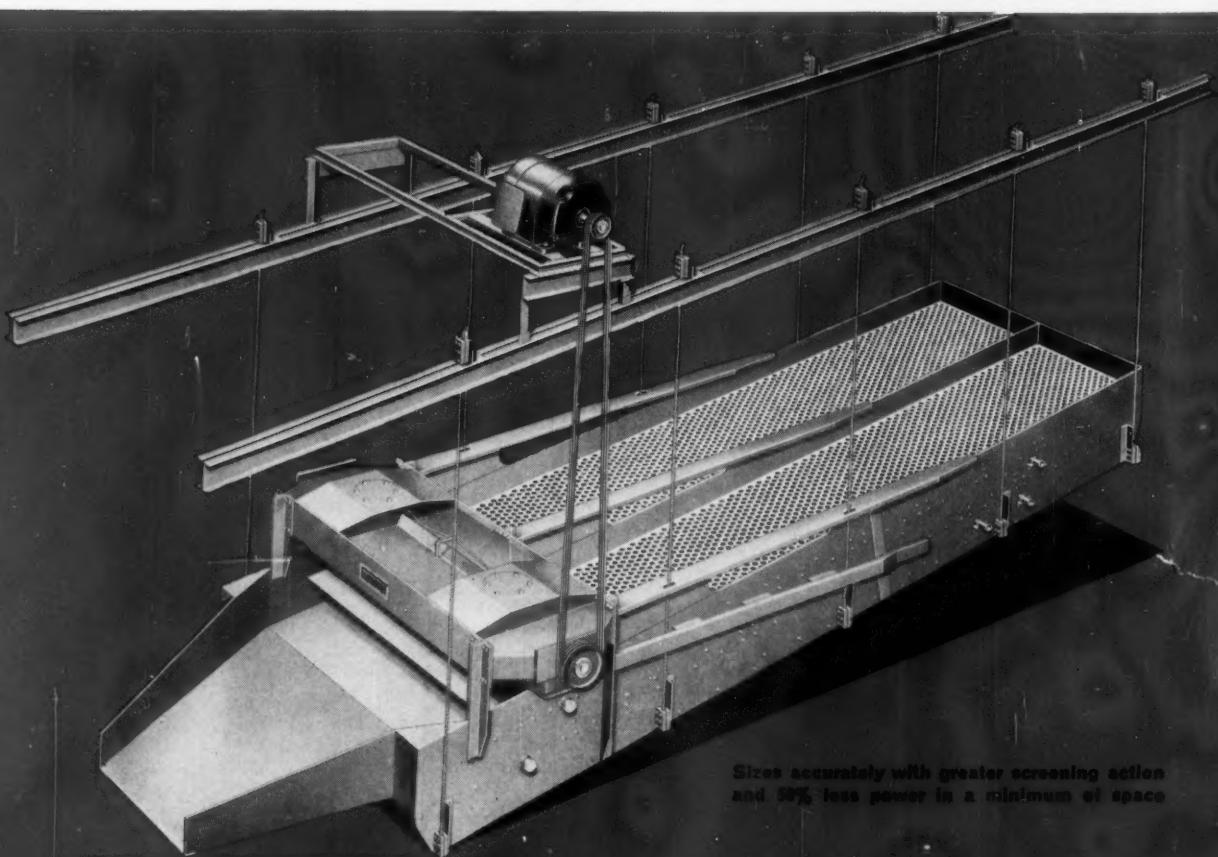
Specially-designed loading machine
and haulage units work thin seam p 90



Preparation in Illinois ▶

Heavy-media system, jig circuit
and air tables fill needs . . . p 80

SAVES SPACE—SAVES POWER—SAVES MAINTENANCE



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Here's the screen that's the last word in efficiency and economy—space saving, power saving, structural maintenance saving—yes, even saving wear and tear on the facility where it is housed!

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Belt's load won't take a spill even when it's on the ropes

THIS rope conveyor takes coal from the mine face to the mother belt—some 2000 feet away. Its partner on the job—a B.F. Goodrich belt made with Nyfil fabric.

Notice how flexible the belt is, how naturally it troughs. It's the use of B.F. Goodrich Nyfil fabrics that makes this belt work so well on a rope conveyor, makes it so flexible it can carry coal at high speeds without spilling a lot of it along the way. And unlike other stiff, boardy belts, a BFG Nyfil belt keeps its cupped shape when empty as well as fully loaded.

It's important to know, too, that

B.F. Goodrich makes this belt with a special fire-resisting rubber that'll neither support combustion nor spread flame (U. S. B. M. Acceptance No. 28-6).

Besides making belts safer, this combination of fire-resisting rubber and Nyfil fabric also makes a belt impervious to oil and grease. Makes it highly resistant to the wear and tear of impact, abrasion, gouging. And the fabric used practically eliminates the danger of mildew and rot.

Before you buy or specify a new conveyor belt, think about the safety, performance, low maintenance and long life you can get with a flexible,

fire-resisting B.F. Goodrich Nyfil belt. Your nearest BFG distributor can supply full information, or write the *B.F. Goodrich Industrial Products Co., Dept. M-933, Akron 18, Ohio.*

B.F. Goodrich
CONVEYOR BELTS

"Our TD-25's deliver 25% than the '24's' they

—Tommy Belville, for Belville Mining Company, Inc.,



more load replace"

Ironton, Ohio



"Our three International TD-25's are delivering 25% additional load, compared with previously-owned TD-24's," reports Belville Mining Company, Inc. "The TD-25 has more power to work at faster speeds without loss of motion."

"Another big advantage of the TD-25, mighty important in outcrop cutting, is you can back it up extreme grades at the faster speeds without changing gears."

"Belville" teams "25's" with a 7-cu yd dragline and a 2 1/2-cu yd stripping shovel—to remove overburden as deep as 60 feet. The tractors are also used to level for the shovels, clean coal, construct roads.

"Live track" power-steering!

Like the TD-24, the TD-25 gives you exclusive "live track" Planet Power-steering—to make full-load, full-power turns, or slam straight ahead with offset loads. With combined on-the-go, HI-Lo power-shifting, you get instant, up-or-down matching of power to condition.

You turn with the dozer fully loaded, without spillage. You get constant-contact benching or highwalling, applying full power, getting full speed. You eliminate "dead-track drag" and "gear-shift lag."

With exclusive new International DT-817 Diesel engine wallop, the "25" bulls along, 230 turbocharged hp strong—with out "slow-motion" lug-downs. New TD-25 seven-roller tracks are strength-matched to full engine effort. And the "25" is platformed on super-rugged double-box-beam frames to meet slam-bang conditions!

See what it means in extra profits to beat the famous TD-24 by 25% or more. Compare planet-drive "25" ability to outearn king-size clutch-steered rigs by amazing margins—clearing land, blading rock, benching, mass-production overburden removal. Let your International Construction Equipment Distributor demonstrate.

Benching an access road on a 1-to-1, or steeper, mountain slope. The operator of this Belville-owned TD-25 takes maximum advantage of "live track" Planet Power-steering—to gouge out stumps and boulders and cut shale—without "bank-nosing" or sluing. He simply operates the bank-side track in high-speed range, the other in low-speed range—for full-capacity, straight-ahead performance.



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Construction
Equipment**

International Harvester Co.,
180 North Michigan Ave., Chicago 1, Illinois
A COMPLETE POWER PACKAGE

Two of "Belville's" TD-25's remove up to 50% of the overburden from a coal seam—produce 25% more than the "24's" replaced. Only simplified TD-25 planetary design gives you "live track" power-steering and on-the-go power-shifting.



ON
COAL
FROM
THIS
SIZE



TO
THIS

THE BIRD-HUMBOLDT SCREEN CENTRIFUGE

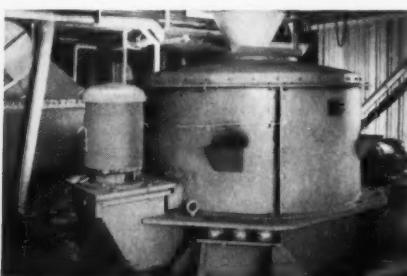
DELIVERS IT DRY — taking minus $\frac{3}{8}$ " coal from sludge tanks or vibrating screens the Humboldt gets it as dry as can be obtained without heat — 4 to 6% surface moisture is typical.

DELIVERS IT WHOLE — degradation is negligible due to the Humboldt's oscillating action which eliminates scrapers and scrolls.

DELIVERS ALL OF IT — virtually no loss in the effluent.

DELIVERS BIG VOLUME — up to 80 tons per hour.

DELIVERS IT AT LOW COST PER TON — even on hard seam coal, Bird-Humboldt screen life is 2000 hrs. or more; a 20 HP motor is all it takes to handle full tonnage.



Compare this point by point with any screen centrifuge you've ever seen or heard about. Then ask us for recommendations and estimates.

BIRD-HUMBOLDT Centrifugal Coal Dryer

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This Month in

NOVEMBER, 1960

COAL AGE

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► Competition

Outlook: Coal vs Natural Gas	p 74
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W. A. Raleigh Jr., Associate Editor, *Coal Age*

Look for gas competition to get tougher in the industrial boiler-fuel market before it eases off, probably between 1963-65. Pressures for producer-price relief should go critical then and accelerate the trend for gas to price itself out of the industrial market. Best bet for fighting gas growth in residential and commercial markets is through backing electric utilities in their drive for all-electric service. Ironically enough, sometime during the seventies, an alliance between coal and gas to produce coal-based high-Btu pipeline gas is still much in the offing.

Panel Pluses—How the Gas Industry Sees Its Future, 1959-70; FPC's New Area Pricing Upsets '61 Gas Bill Plans; Coal-based Natural Gas: When . . . Why . . . How.

► Preparation

Better Preparation: Gateway to New Marketing Opportunities	p 80
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Three-stage washing at the Ziegler No. 3 preparation plant has made it possible for Bell & Zoller Coal

Co. to find new markets in the steel industry. Replacing obsolete facilities 3 mi from the mine site, the No. 3 plant features a Dutch States Mines heavy-media washer for recovering metallurgical coal. A McNally-Pittsburg jig washes crushed middlings and air tables clean fines. A clean-coal crushing and rescreening circuit provides maximum flexibility in blending and loading.

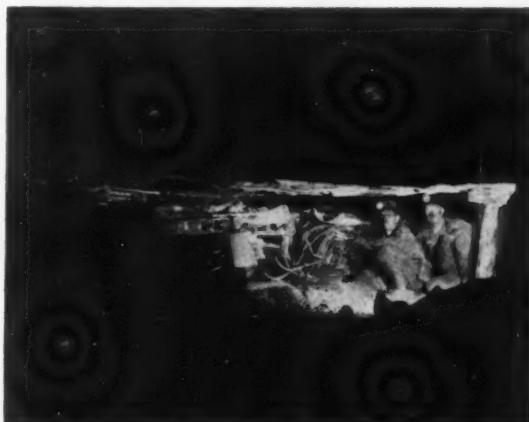
In Addition—Plant flow sheet; details of crushing, rescreening and storage.

► Surface Coal Recovery

Upland Dredging for Power Fuel	p 86
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Fine coal from an anthracite washery was sluiced to an abandoned strip pit during World War II operations of the plant. Later inflow of water, from the surface and underground workings, covered the deposits of coal. Now, an enterprising coal man recovers the coal with a floating dredge.

Tips—Floating pipelines and multistage pumping provide economical coal-handling.

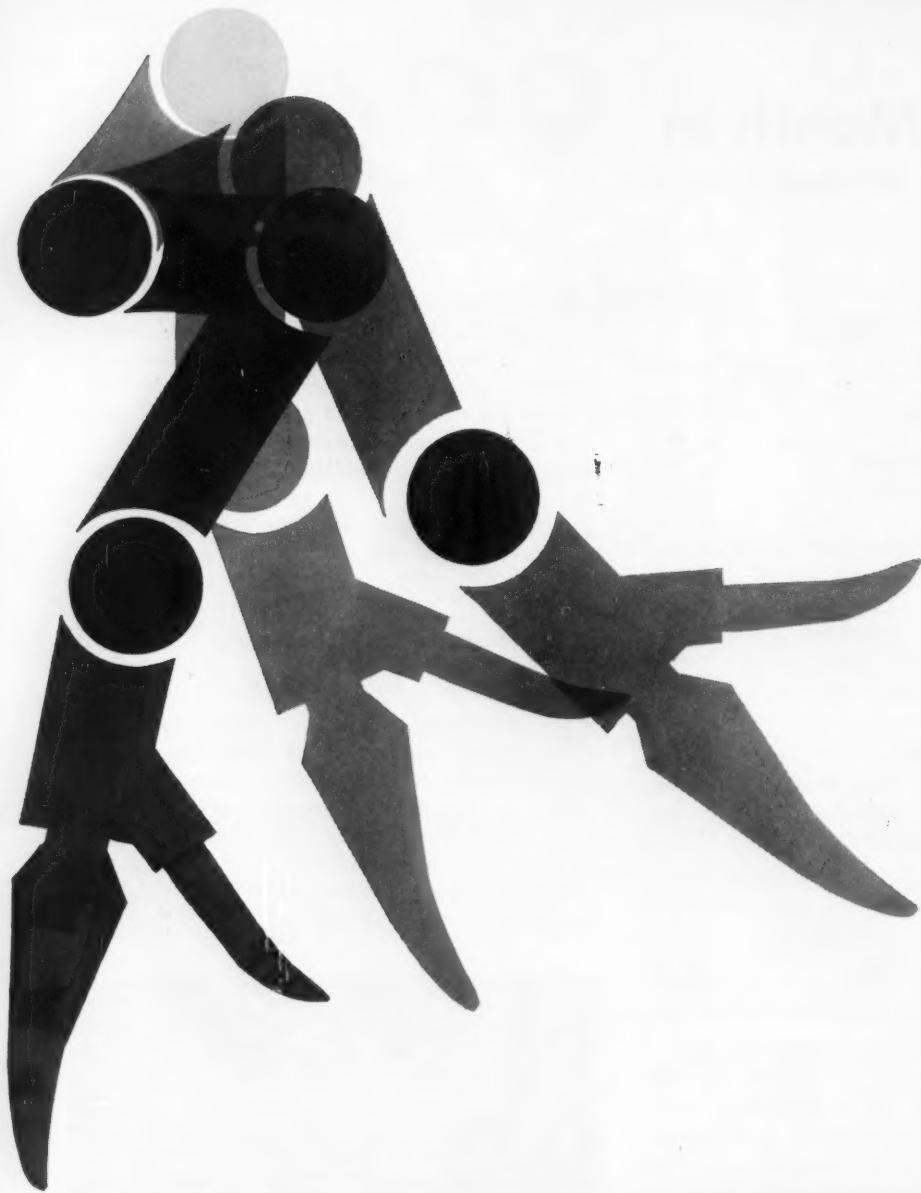


► Mining

Deep Mining 30-in Coal in Virginia	p 90
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There are approximately 1,340 mines in southwestern Virginia producing from 1,000 to 50,000 tons annually.

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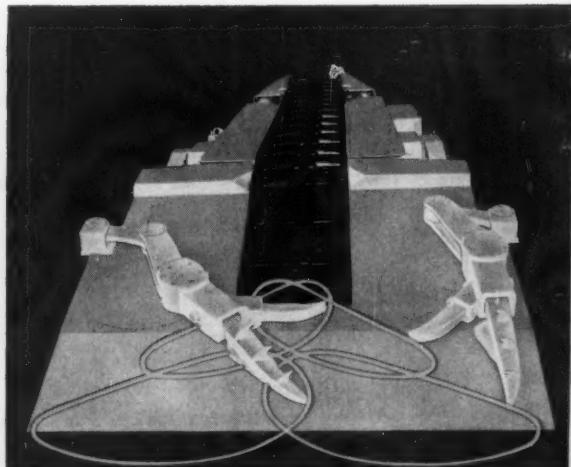
NEW DOUBLE-ARM GATHERING DESIGN MULTIPLIES LOADING EFFICIENCY

No other loading machine even approaches the new LONG-AIRDOX 188-3 in overall performance, economy, and versatility. One reason is the 188-3's exclusive reverse link, double-arm design.

This new concept in loader construction offers these important benefits: shorter, more powerful strokes (with 30% more torque per stroke); faster, more positive gathering; less scattering of material; higher tonnages; greater efficiency.

Other advantages provided by the 188-3 include: savings on maintenance and parts inventory resulting from the simplified single motor design, better maneuverability due to independent crawler control, flatter head angle, and unusually good balance.

Available in heights 23½" and up, with capacities to 12 tpm, 188-3 loading machines are applicable to all popular mining systems. For details or a demonstration, write Long-Airdox Company, Division of Marmon-Herrington Company, Inc., Oak Hill, W. Va.



LONG-AIRDOX

This Month in Coal Age—Cont'd

These mines operate in seams ranging from 24 to 30 in in height. Special equipment and unorthodox mining methods are used to produce coal economically. A typical operation is the Jewell Ridge Coal Co.'s No. 10 mine located at Jewell Valley, Va. Mines are kept small due to seam conditions and locations. Daily tonnage—one shift—at this operation is from 250 to 300 tons. Yet the state's total production for 1958 was 26,826,067 tons. This spells big business for small operators.

Self-Styled—Loading machine is a cross between a 20 BU and 14 BU and is only 24 in high.

Maintenance Ideas

Bearing Maintenance: Lubrication p 94

The coal industry spends from \$10 to \$13 million per year on bearing replacement alone. Bearings do not fail without cause. One major factor which contributes to bearing failures is improper lubrication or the lack of lubrication. A better understanding of how lubricants are made and what they do will help reduce these failures.

Three-Phase Coverage—(1) Select the right lubricant, (2) apply it at regular intervals and in correct amounts and (3) store lubricants properly.

A Handy Rule p 97

Everyone who has studied the fundamentals of DC motors and generators is familiar with Fleming's right-hand generator rule and left-hand motor rule. A new approach to this rule was described in a recent issue of *Westinghouse Maintenance News*. It recognizes the fact that for DC machines there are only four fundamental conditions which can be changed.

Worth Knowing—It's easy to remember and can be used to answer many questions that arise about DC rotating-machine performance and control.

Transportation

Field Experience With Solid-Carcass

PVC Belting p 102

Extensive tests of conveyor belting made of PVC-impregnated solid-woven nylon and cotton demonstrate that the material offers long life and high resistance to wear or damage. Nature of the materials used in constructing the belt also insures oil-, water- and mildew resistance. Training ability is good, and splicing is easier while holding power at splices is increased. This type of belting is thinner, thus lighter, making it easier to move and handle.

Field Applications—Views of PVC solid-carcass belting in use.

This Month

in **COAL**

BACK TO SLOW—After the expected mild bulge in bituminous production in the third quarter the question becomes: "What about the fourth?" At the moment there is nothing to indicate that it will be ahead of the third, meaning that it will be about like the fourth quarter of 1959. Thus bituminous will wind up 1960 with a modest gain of around 8 million tons. For anthracite, the picture is radically different. The accelerated rate of slippage working the opening of 1960 continues, with result that hard coal will probably suffer a loss of about 2.5 million tons in production, or approximately 13½%.

BUSINESS AHEAD—The long-awaited and highly desired upturn in business activity still is in the future. No one expects it in the last quarter, though a few manufacturing concerns have noted some indication of upturns in orders. So far it is impossible to tell if this is the beginning of a trend. Certainly there is little indication so far of recovery in the steel rate—so vital to coal. At the moment a sizeable group of economic soothsayers, as well as business men, see nothing too definite earlier than the second quarter of 1961. And the fear that the economy is just starting a plunge into a real depression continues to plague some authorities.

PRICES AND EARNINGS—Though tonnage is off, coal by and large continues to fare rather well in prices and earnings compared to past recessions and depressions. Prices have reflected the pressures generated by reduced demand, but have held fairly well. This situation should continue, and as a by-product make coal stocks look better and better as an investment—this despite the recent dividends cut by one major commercial producer, which still leaves its earnings rate at better than 6%. Summing up, there are some very good buys in coal stocks from the standpoint of return on investment, with the added benefits of price appreciation when demand gets back to normal.

THE NEXT ADMINISTRATION—Whether Nixon or Kennedy would be the next President was still undecided at the time this was written, but the character of the next administration already was becoming apparent in the history, personal characteristics and views of the candidates. Both are young, neither is a war hero and both have been politicians all their adult lives. The winner will be under pressure to make a reputation in office, but at the same time he will have to contend with a Congress little different in its views from others of recent vintage. Summing up, more government and more expensive government—how much more depending on the temper of Congress—is in the offing no matter which one makes it.

DEPLETION—At least one major oil company, which is fairly heavily involved in production in the United States, is pessimistic about retaining the present depletion rate. This does not necessarily mean, in the opinion of the company, an immediate cut in the next Congress. But the pressure is there and it is felt that it will result in action. If there is action on oil there could be revisions in other rates as well. These revisions don't have to be up, some coal men have observed, but they could be if the campaign is carried on vigorously.

This Red Rubber is a better rubber for runners pumping abrasive pulps because

it has...

**Higher tensile
strength**

**Higher tear
resistance**

**High resilience
and
Greater abrasion
resistance**



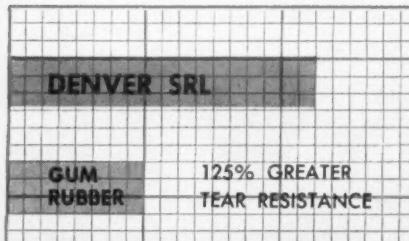
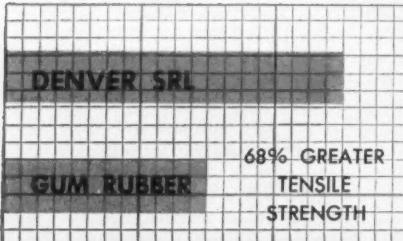
**This permits handling coarser pulps at
higher pumping speeds and heads...at lower costs!***

These DENVER SRL Pump runners are especially suited for pumping grinding mill discharge to cyclone classifiers where coarse particles (up to $\frac{3}{4}$ ") normally would be a problem.

Tough, live DENVER SRL Red Rubber outwears, outlasts, outperforms generally-used gum rubber and allows DENVER SRL Rubber Lined Pumps to be used where metal pumps have been considered necessary.

*We are interested in cutting your pumping costs—and we have the pumps to do it! Give us a chance at your toughest pumping job.

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This Month in Coal Age—Cont'd

► Electric Power

Application of Switchgear to Coal

Operations p 110

R. N. Wilson, Application Engineer, Switchgear Dept., Allis Chalmers Mfg. Co., Milwaukee, Wis.

Selection of load-center switchgear must be coordinated with the primary feeder system and the secondary feeder circuits to insure application of breakers with adequate interrupting and continuous-current ratings. After the correct breakers are chosen, the number of feeder breakers can be selected on the basis of load requirements. Several variations in distribution systems are offered.

Schematics—Distribution-system diagrams; methods of calculating breaker settings.

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This Month in Mining Practice

DIESELS UNDERGROUND—The appearance of a rubber-tired diesel-powered underground hauler at the Bluefield Coal Show caused a few ears to prick up and generated some renewed interest in getting the ban on the use of such equipment in coal mines lifted. One can bet that such lifting will take place, but wagering on when, is fraught with considerable uncertainty. It could be any time, but not many expect it soon—and some of the more pessimistic say that it will take another trolley-caused mine fire to do it. If the ban is lifted? Little change in the picture for a year or two or more until production of present offered equipment can be built up and new units developed, then a steady replacement of trolley systems.

REFUSE QUESTIONS—The day when gob piles could be allowed to burn is practically gone because of air pollution, and the day when surface disposal may be touch-and-go because of water pollution seemingly is approaching. For the moment ignition can be prevented and appearance enhanced by layer dumping and compacting, plus scaling of the pile faces and certain other measures. Acid water runoff is something else—at least in certain areas and with certain terrains. If runoff from or through refuse piles is considerable, the advice of authorities is, "look out! you're under the gun, and had better start hunting an answer now."

PLUS 40—The debate over the possible advantages of 40 to 45 degree idlers for belt conveyors still goes on while the majority of the installations using the fixed idlers continue to be the old 15 or 20 degree. Whether such angles as 45 degree may ever be reached becomes a question in view of the fact that such high angles seem to offer little in increased capacity while giving belt manufacturers serious pause when it comes to guaranteeing satisfactory performance and life. Some studies show that going up to 35 to 37 degrees raises capacity some 15 to 18%, while stepping on up to 45 degrees provides only 2 or 3% more. Higher idler angles apparently are in the cards but perhaps not as high as originally thought.

THE PUSHBUTTON MINER—Field progress is such that the first commercial version of the remotely controlled underground miner will go into regular service by the end of the year. Interest in what this "pushbutton" unit will do is high and results of initial operation will be thoroughly mulled over by a lot of coal users in the U. S. and abroad. The expectation is that they will, such as to open the way to a rapid acceleration in the use of such equipment.

LUMP BUSTERS—Though conventional loading continues to decline it will represent a substantial tonnage for some time to come—and will continue to offer some problems, such as the size of lumps delivered to loader conveyor openings. Now separate breaking units ahead of belts are being offered. These and other steps indicate that where lump is a handling problem several types of reduction units will be available in the future.

engine power

BY CATERPILLAR

25 PER CENT MORE TONNAGE AFTER REPOWERING WITH CAT

Even in these days of conveyor belts and off-highway trucks, retooling a 33-year-old railroad can be a very profitable investment. For the Material Service, Division of General Dynamics Corporation, in Lockport, Illinois, more capacity, greater savings resulted.

By replacing the power plants on five of its nine 65-ton diesel locomotives with Caterpillar D353 Diesel Engines, 11-car trains can now be hauled on round trips of 24 miles compared to only nine before repowering. Each train hauls about 550 tons of bank-run material from the pits to the processing plant, a 25 per cent increase over the old capacity. The 0.85 per cent grade with the full load offers no problems for Cat Engines.

Five trains used to be needed to maintain production compared to today's four, which meant two additional sidings for main-line passing. This kind of operation has enabled the company to pay off the power conversion in less than a year's time and given it a more profitable outlook for the future.

Here is more proof that Caterpillar Engines are your best repowering investment. Post-installation performance justifies the choice down the line. And all this comes from an investment that's only a fraction of that for purchasing new equipment to replace the entire unit.

When you repower with Caterpillar Diesels, you can save several thousands of dollars on fuel alone, compared to the cost of gasoline. You save on maintenance because Cat Engines require minimum care. Service and parts are quickly available from your nearby Caterpillar Dealer.

He can help you make the right choice . . . whether you repower locomotives with a minimum investment, or purchase new equipment from the many manufacturers who insist on Cat Engines. Either way you gain the unique advantages available from Caterpillar. Ask your Caterpillar Dealer for the facts. Or write for the free booklet, "Caterpillar Engines for Railroad Power."

CATERPILLAR

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Engine Division, Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

The Coal Commentator

Rock Conqueror

The day of the half-million-dollar overburden drill may not be too far off. New models now in service are within yelling distance from the ready-to-go cost standpoint—and at the same time are providing phenomenal penetration rates. As one *Coal Age* editor, who saw one of the new big jobs in action, puts it: "It goes through rock like a torch through snow."

These pages also carried, a while back, the first suggestion for a multihead unit on a turntable, instead of just the one on the present full-revolving machine. It can be done in the opinion of drill builders, and the expectation is that it will be for those pits that can use such a unit. Such operations probably will not be numerous but the lessons learned in the design of the big multihead machine undoubtedly will bring about improvements in the units for smaller operations and less-severe duty.

Old-timers can remember the gangs of drills that were then—and to some extent still are—necessary for high production in heavy rock. Soon perhaps, the operator of the one big unit replacing the gang of smaller machines, probably will be getting lonesome all by himself out on the bank.

Anticipate Or!

Though it is still on the dignified side one can see where some unceremonious elbowing could develop among state and government agencies anxious to get the lion's share of the business of regulating pollution of both air and water. In fact, this possibility was brought out by a representative of the Commonwealth of Pennsylvania at a convention recently, when he remarked that in handling gob piles the Air Pollution Commission and the Sanitary Water Board might have some problems to work out between them regardless of the approach adopted. And in Washington in December the Department of Health, Education and Welfare is attempting to get farther into the clean-water picture through a major conference kickoff.

All this is evidence that, as has been repeatedly pointed out, the pressure will grow rather than lessen. It further reinforces the also oft-repeated injunction that coal must anticipate the further turn of the screw and take positive action of its own to eliminate or alleviate, on a reasonable and economical basis, all forms of pollution. In short it must anticipate or very likely suffer unduly.

Still the Mainstay

Recent announcement of a new ironmaking process highlights once again two present facts about iron production: (1) the blast furnace and coke still hold their traditional position since these are being called upon for almost all the additional pig-

iron capacity; (2) even if substitute processes do become economical and therefore accepted, coal more likely than not still will be very much in the picture. The new process uses fine iron ore mixed with coal fines (noncoking-quality) and limestone, which then is pelletized and sintered to produce self-fluxing self-reducing pellets at about 1,500 F for final electric-furnace melting. With the electric furnace in the picture, coal also comes out ahead because it will be used to make the juice.

Coal still is the mainstay of iron-ore smelting—and will remain so for a long time to come.

New Member

The club of "sick industries" now has a new member—proposed by no other than Lyndon B. Johnson, senator from Texas and erstwhile vice-presidential candidate. This new member is the oil industry and Mr. Johnson hung the "sick" tag on it Sept. 13 in the course of a speech in Roswell, N. M.

Nobody seeks to be a member of the "Sick Industry Club," but as coal well knows it sometimes is a distinction hard to avoid. But coal lived with this tag a long time, in part because of the operations of the oil industry. Perhaps, however, it still can be charitable and hope that oil can get rid of the epithet sooner than coal. Perhaps coal can even cooperate with oil in at least some directions, one being making common cause against the common enemy—natural gas. In fact, such cooperation is a logical approach and may become even more of a reality in the near future.

Heart Help

Do you yawn frequently? Do you have to sleep on a higher pillow? Do you frequently feel as though small bugs are crawling over your chest?

These questions are answered in a new book on the heart and its troubles by Dr. C. A. D'Alonzo, assistant director of the medical program of du Pont (Gulf Publishing Co., Houston, Tex., \$3.50 in bookstores). If you answer to the first is "yes," you are either bored or need more sleep. If the answer to the second is "yes" also, see your doctor—you may have a heart disease. If the third is answered the same way, the author says: "Don't bother reading this book—you have more pressing things to do." In such vein the book ranges through the subjects of heart murmurs, coronaries, strokes, arteriosclerosis, heart failure and other troubles.

The book doesn't make light of these killers but does make them understandable from the standpoint of what they are, what they do and how they are treated. If you are interested in what's what about the Nation's No. 1 killer, this book can help in many ways, including dispelling some of the fantasies that worry people when this possibility pops into their mind.

NO MATTER WHAT YOUR SEAM CONDITION

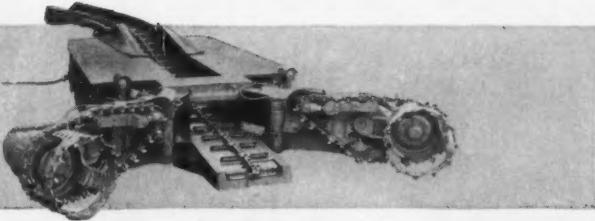
JOY HAS A CONTINUOUS
MINER FOR HIGHEST PRODUCTION

Joy has a continuous miner for every seam condition in high, medium or low seams. Your Joy representative can make impartial recommendations in applying the proper machine to meet the requirements of various seam conditions. For bad roof conditions, integral roof bolting drills may be mounted on most machines and operated while the machine is running.

This complete line is the result of Joy's pioneering and experience with all types of continuous miners. Discuss your problems and seam conditions with your Joy representative. He has the facts and figures to prove that you can get high production regardless of conditions.

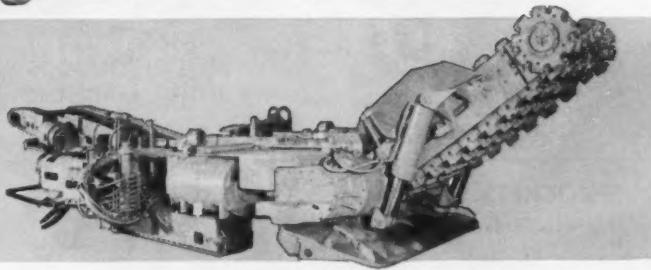
Model CU-42

Joy's newest low seam miner, manufactured at the Compton plant, is available in heights of 30" and 32". Two barrel-type high lump recovery cutter heads swing horizontally from rib lines to center line to mine widths from 14' to 24' in seams from 36" to 54".



Model 5-CM

A field-proved miner 32" in height for high production in medium-low seams. Delivers 4 to 5 tons per minute. High tonnage comes from a 42" wide ripper head that swings 24" into the coal.



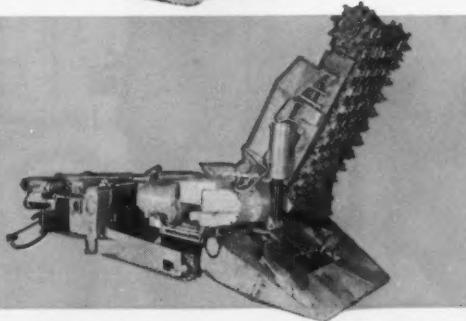
Model 1-CM

Designed for seams 52" and higher, this ripper miner has a capacity of 4 tons a minute. Mounting a 4½" ripper bar, the 1-CM reaches up to 90° above the floor to rip a 42" wide cut. Can operate in rooms 12 to 19' wide; turn a 14' crosscut 90° from a 14' room.



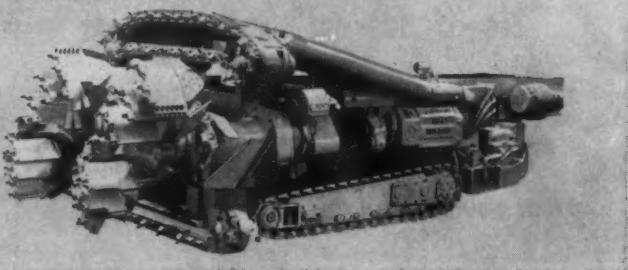
Model 6-CM

A high-capacity ripper type miner rated at 5 to 5½ tons per minute. Will mine rooms 12 to 22' wide without adjusting or repositioning the machine. Can mine any seam from 5½ to 10' high without changing or adjusting parts. This extreme flexibility makes the 6-CM ideal for all phases of mine development. An independent gathering arm cleanup can load the conveyor while shuttle cars change.



Model 2-BT-2

The Joy Twin Borer, a full-face boring miner for 6 to 8' seams, does any job underground—developing work, driving entries, headings, mining rooms and extracting pillars. The boring arms and top trimmer chain give excellent roof control with arched sides and a smooth roof. The top trimmer chain can be adjusted instantly while mining to follow variations in seam height.



**WORLD'S LARGEST MANUFACTURER OF
UNDERGROUND MINING MACHINERY**



Coal Drills



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Shuttle Cars



Continuous Miners

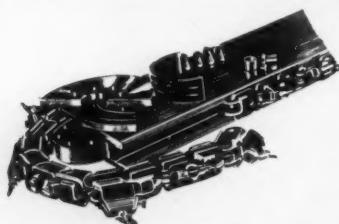
JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company
(Canada) Limited, Galt, Ontario

New SUPER-STRONG No. 80 CUTTERBAR

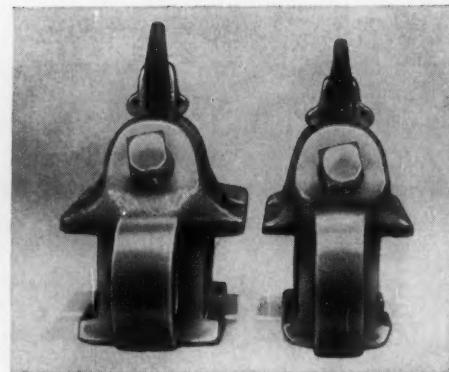
built to fit all of the newest heavy-duty machines, designed for use of the stronger new Bowdil



AVAILABLE WITH BIT OPENING $\frac{1}{2}$ " x 1" (takes all type bits)

CHAIN #40-3

ALSO USED
ON CONTINUOUS
MINING MACHINES



new #40-3 standard #40-1

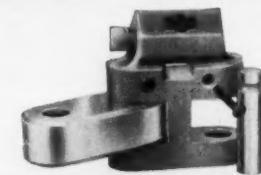
SPROCKETS FOR ALL MINING MACHINES

Bowdil Sprockets are made from special heat-treated alloy steel. Our stock of over 100 different styles includes clutch, spline and keyed types—various tooth designs of 4 to 13 teeth.



New Small, Versatile
"THIN-KERF" CHAIN
and CUTTERBARS

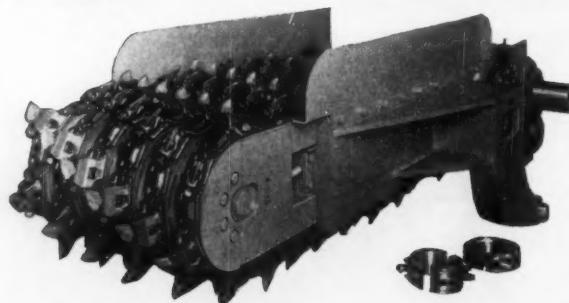
Lends itself best to use on machines delivering up to 15 h.p. and kerf of $3\frac{1}{2}$ " to $3\frac{1}{2}$ ". Reduces amount of cutting to the point where higher feed speeds are realized . . . and CLEANER CUTS!



Newest type TRIMMER CHAIN

for all makes of CONTINUOUS BORING MACHINES

Great strength and flexibility. Uses Bowdil Throwaway or $\frac{1}{2}$ " x 1" Shank Bits. Chain pitch may be varied by changing couplers only. NOTE COUPLING PIN DESIGN . . . chains may readily be assembled or disassembled with use of small hand tools.



6-IN-ROW RIPPER HEAD

Using 6 renewable independently adjusted Cutterbars, with all 6 Chains similar in kerf and lacing arrangement for interchangeability. All 6 sprockets interchangeable. Improved design head drive shaft and sprocket assembly using 2 piece sprockets to maintain extreme tension to the shaft.

These are only a few of the features and advantages in this modern Ripper Head for Continuous Mining. Ask a Bowdil representative or write for more detailed information.

Also:

"No-Bend-'em" Spike Pullers



"Changeable-Points" Hand Picks



"No-Tools-Needed" Rope Sockets



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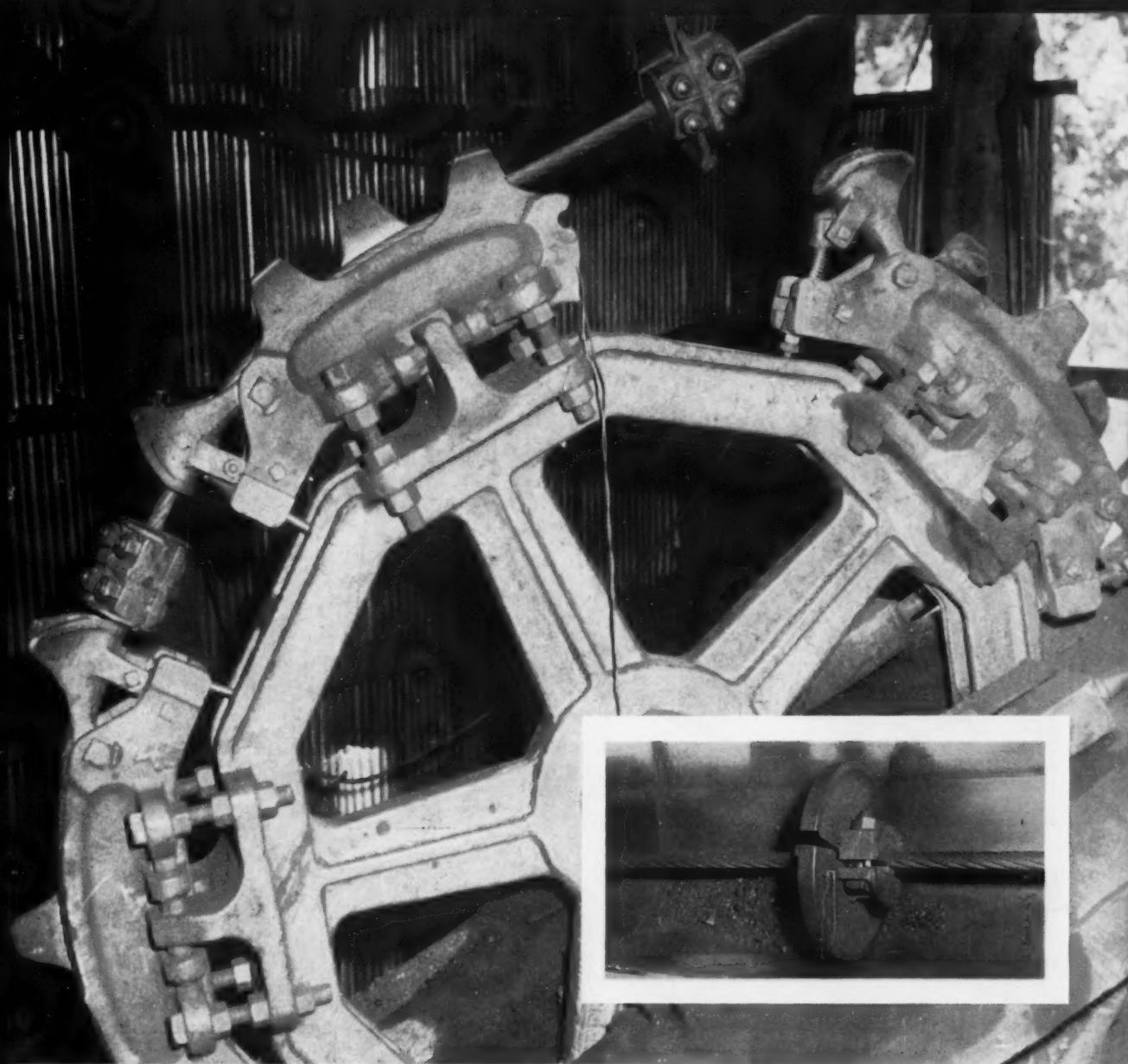
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Bowdil has the staff and facilities for economical designing and custom-building.

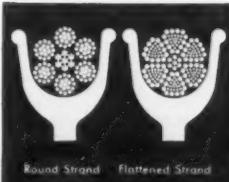
BOWDIL
ALWAYS RIGHT ON THE JOB



40% longer life with Yellow Strand Flattened Strand at V & C Coal Company

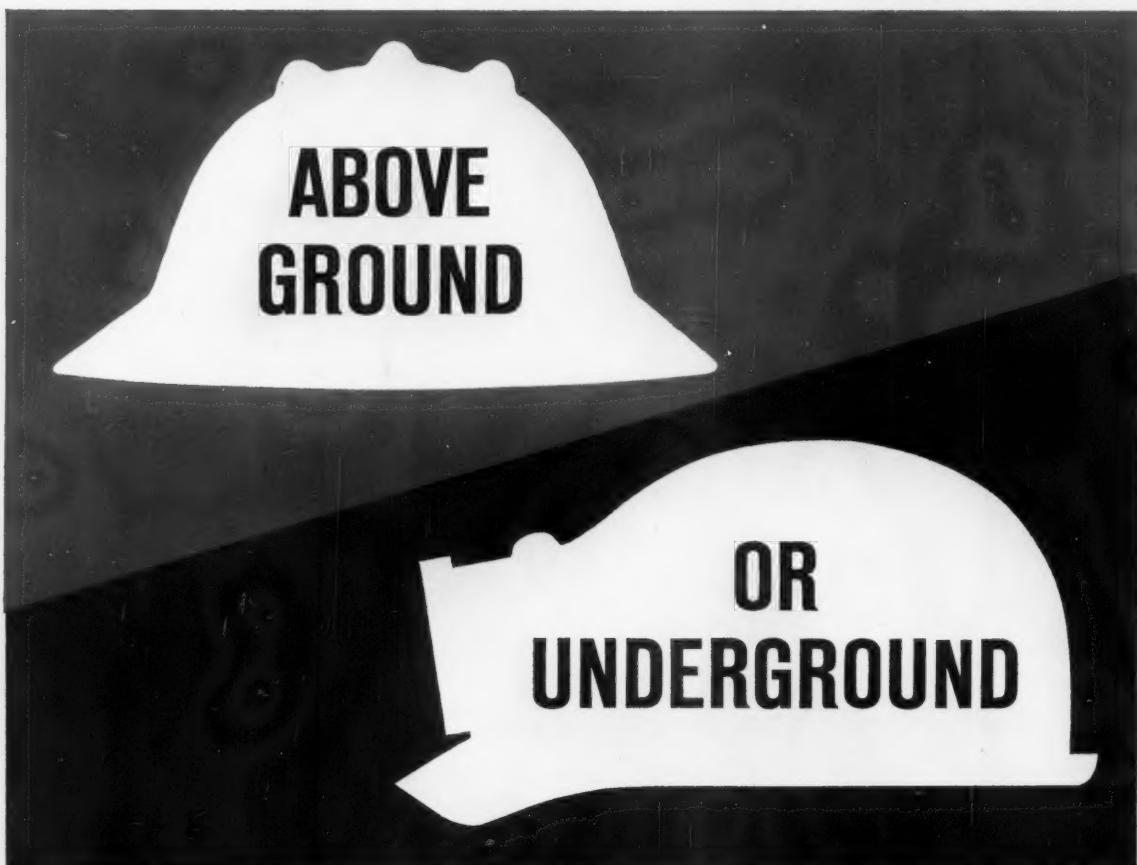
After 7 years of abrasion, scuffing, shock loads, and moving 150 tons of coal per hour, Yellow Strand Flattened Strand Wire Rope has amply proved its extra value and long life to V & C Coal Company, Grays Knob, Kentucky. As the unretouched close-up photograph reveals, the rope is still sound, with no strand deformation and very little wear on the outside wires. Previous wire gave 5 years of service—Yellow Strand Flattened Strand is still going strong after 7 years. Button rotation is 46% less than previous ropes used, with very little button slippage.

For complete details on how well Yellow Strand Flattened Strand can serve you, contact your distributor or check with us. Broderick & Bascom Rope Co., 4203 Union Boulevard, St. Louis 15, Missouri.



These illustrations point up the reasons for Yellow Strand Flattened Strand's exceptional service: Each strand is laid up in a triangular pattern. Contact with the sheave groove is made by many wires instead of a few. Note the marked increase in compactness in Flattened Strand, with greater crush-resistance and 10% more metallic area.

Yellow Strand®
FLATTENED STRAND
WIRE ROPE



Femco-Phone Systems for every mine need!

From one fixed location to another . . . between moving equipment and dispatcher . . . in your cleaning and preparation plants—wherever you need communications there's a Femco system to meet your requirements.

Femco-Phone systems include:

Trolleyphone 3000—The newest model of the first practical mine communication system for use between moving and stationary locations. Features microphone and loudspeaker conversation. Carrier system utilizes existing trolley wire or power line.

Loudspeaking Mine Telephones—For communication between fixed points underground. Two-way paging over loudspeakers saves time—brings you into immediate contact with the man you want. No ringing station after station. System is battery powered, 100% transistorized.

Wired Audio Systems—For cleaning and preparation plants, and for surface supervisory personnel. One central amplifier location . . . paging over wide areas . . . special four-wire communication cable . . . handsets or integral microphones. Desk and paging stations available.

Cagephones—For cage installations in deep mines. Separate or integral microphone and speaker units . . . low-voltage battery powered. FM carrier current utilizes hoisting cable or other existing wires.

Whatever Femco system you may install, you are assured of clear transmission, reliability, easy installation and low maintenance.

For more complete information on the individual Femco-Phone systems for all mining applications, write FEMCO, INC., IRWIN, PA.

A-203

DISTRIBUTED EAST OF THE MISSISSIPPI BY NATIONAL MINE SERVICE COMPANY

Femco

COMMUNICATIONS: Carrier and wired audio systems for all mining and industrial applications. **MONITORING:** Fans, circuit breakers, valves, pumps, compressors, etc. **TELEMETRY:** Flows, pressures and other functions. **REMOTE CONTROL:** Pumps, valves, circuit breakers, soaking pit covers, furnace doors, cranes, or other moving equipment.



Designed for rail 70 lb per yd and over
... BETHLEHEM MODEL 1222 SWITCH STAND

Here, presiding over a turnout built from 85-lb rail, is Bethlehem's low, compact, and sturdy Model 1222 switch stand. Designed for just such heavy-duty service, it really earns its keep at this busy mine.

The 1222 works on the sliding block principle, which develops powerful leverage and makes the stand easy to throw. Yet for all its ruggedness, the 1222 stands only 4 $\frac{1}{4}$ in. above the ties. Thus it is ideal in cramped quarters, on the surface or underground.

Model 1222 has only three moving parts: the lever, the crank, and the sliding block. None of these parts is located

beneath the base of the stand; the entire mechanism stands clear of ballast and roadbed.

You can use the 1222 in connection with a standard rigid rod, or with Bethlehem's No. 11 SFU spring rod as shown above. It can be furnished with special crank to carry standard target lamp, or target only. You can get any additional details about Model 1222 by calling the nearest Bethlehem sales office, or by writing direct to the address below.

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL



Hulbert Lubricants provide proven **PREVENTIVE MAINTENANCE** ... assuring low-cost production

Preventive Maintenance is simply a form of maintenance that guards against equipment failure during actual production. Hulbert lubricants are an important factor in Preventive Maintenance.

Why not ask the Hulbert salesman, a mining lubricant specialist, how to:

- 1 Attain minimum production downtime.
- 2 Reduce major repairs and overhauls.
- 3 Cut maintenance costs—labor and material.
- 4 Get more efficient response from machinery.

The Hulbert salesman knows the answer to the above questions because he understands Preventive Maintenance and his products provide for it.





Fire-Resistant Hydraulic Fluid

Hulbert Hydraulic Lubricants

available in:

55 GALLON DRUM



16 GAL.
DRUM



5 GAL.
PAIL



BULK SHIPMENT



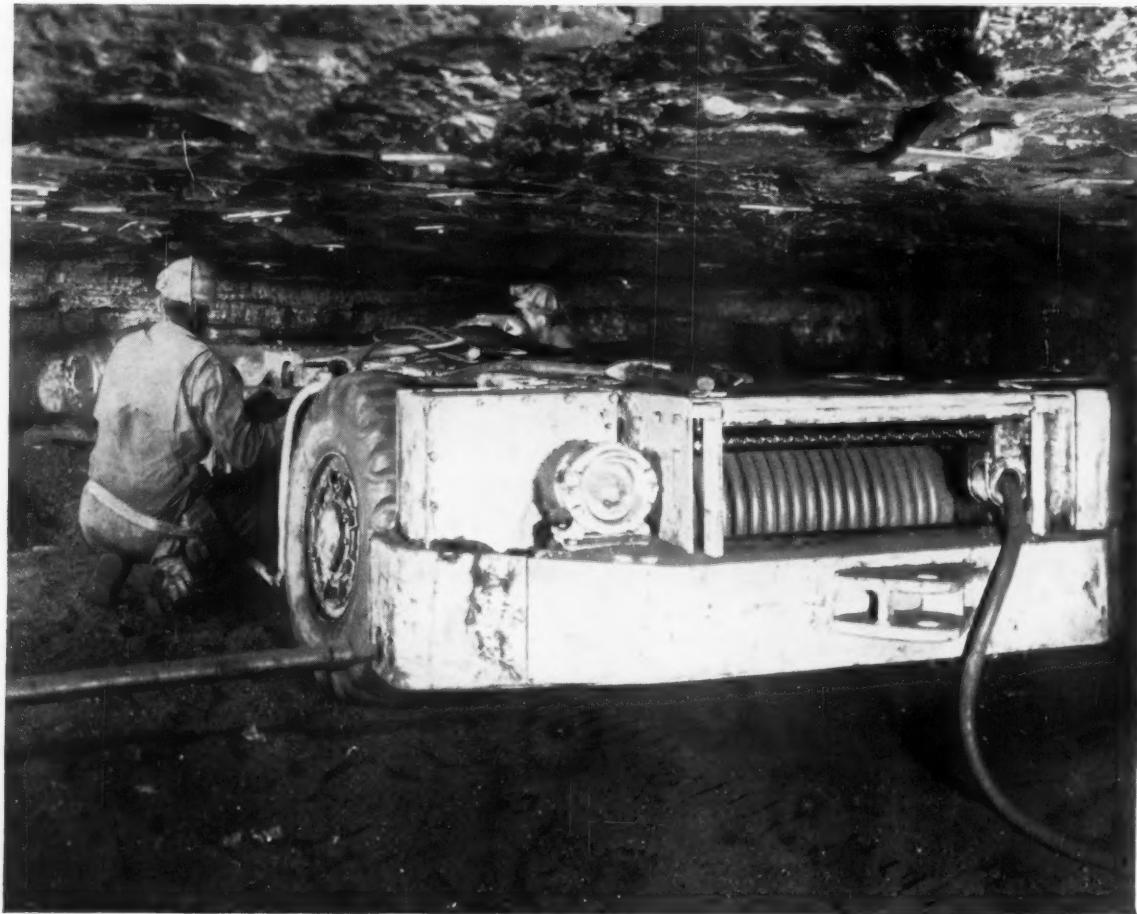
When ordering Coal Mining Lubricants

you can't be wrong in specifying *Hulbert*

HULBURT OIL & GREASE CO., PHILADELPHIA 34, PA.

Specialists in Quality
Lubricants for the
Coal Mining Industry

Industry-proved through a quarter century of service...**THERE'S NO DOUBT ABOUT NEOPRENE**



HEAT:

What are the limitations of your trailing cable?

Reel up layer-on-layer of trailing cable on a mining machine and heat can become a really serious problem . . . especially in the inner layers where it can't be dissipated quickly.

Some cable jacketing materials can't take heat. They soften. They get squeezed out of shape and take a permanent set. They frequently lose their tensile strength, resilience and their ability to withstand abrasion and impact.

Not neoprene synthetic rubber. It retains its

unusual combination of properties at temperatures as high as 250° F. . . . will work satisfactorily if the temperature occasionally goes even higher. Combined with its resistance to acid water, oil, grease and physical abuse, this makes neoprene your surest cable jacketing investment. Remember, all of its properties have been *proved* through 25 years of electrical service. E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Department, CA-11, Wilmington 98, Delaware.

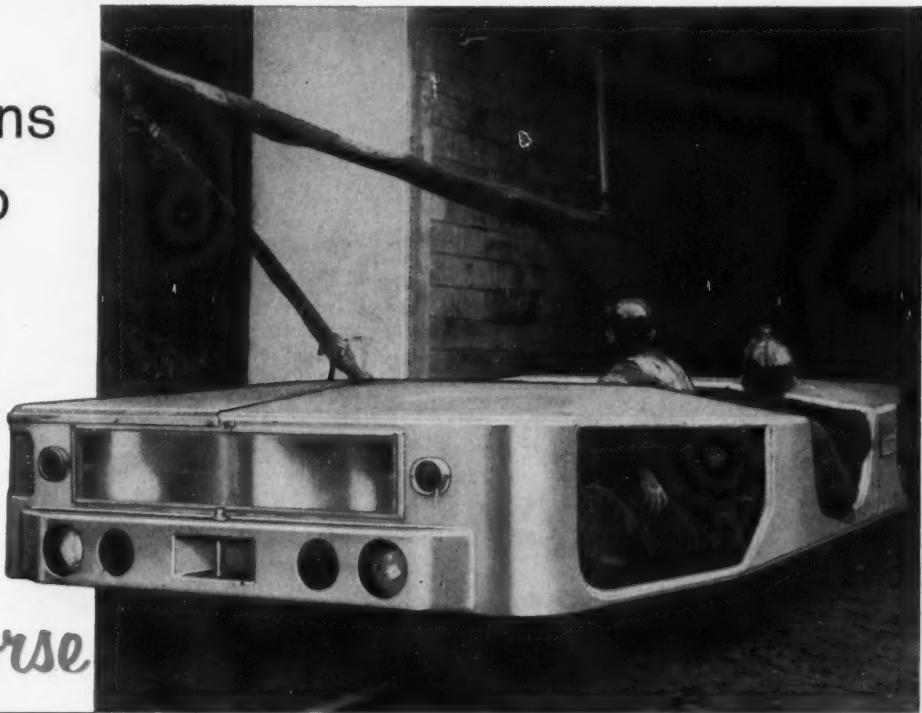


NEOPRENE

Better Things for Better Living . . . through Chemistry

Reasons
why so
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use
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Lee-Norse



LOW mine portal bus

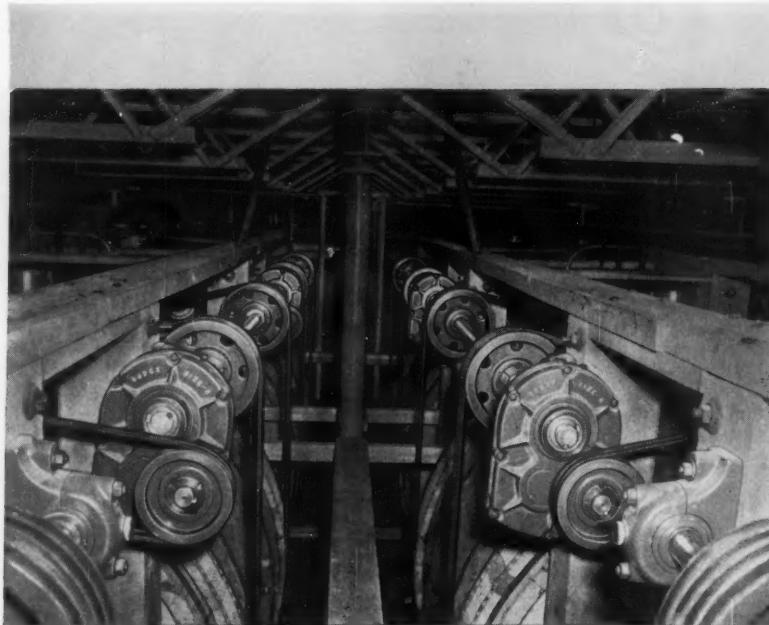
- 1** **FAST**—Cuts portal to portal time as much as 50%.
- 2** **STREAMLINED**—Transports 11 to 13 men in safety and comfort in low seams.
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- 4** **POWERFUL**—Self-propelled by sturdy traction-type 15 HP gearmotor (250 or 550V—DC).
- 5** **RUGGED**—Quality built to withstand the hard usage of 'round the clock mining!
- 6** **LOW MAINTENANCE**—Simple design—easy accessibility.
- 7** **OPTIONAL FEATURE**—Electric dynamic brakes for plus safety on severe grades.



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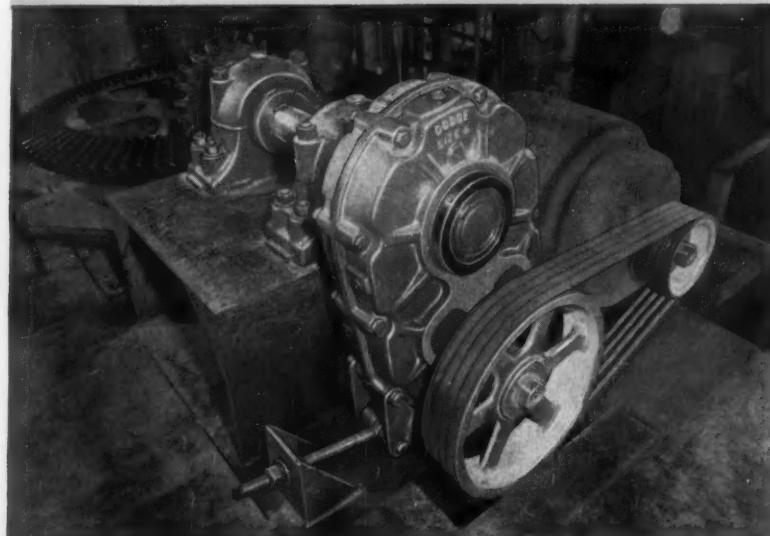
CHARLEROI, PENNSYLVANIA

Specialists in Coal Mining Equipment



**DODGE TORQUE-ARM
SHAFT MOUNTED
SPEED REDUCER**

Install it anywhere—with minimum time and effort. Here is an overhead installation on tanning drums. Torque-Arm reducers are resistant to acid fumes, salt water environment, moisture.



**DODGE TORQUE-ARM
SHAFT MOUNTED
SPEED REDUCER**

Can be positioned any place on the entire length of the shaft. It locks into place on *both* sides of the housing. Note modified torque arm on this installation on a mixer in a beverage plant.

The Speed Reducer Idea that

Two things account for the record popularity of Dodge Torque-Arm Speed Reducers. First, they cost less to install since they require no foundations, sliding motor rails or flexible couplings. Second—and most important—these modern reducers as developed by Dodge perform *brilliantly*. Tens of thousands of installations underscore Torque-Arm dependability. Torque-Arm is America's *quality* shaft mounted speed reducer!

Torque-Arm has been so extensively adopted by industry that today models are available for a vast range of applications. The Torque-Arm line offers you capacities up to 170 hp—output speeds from 10 to 400 rpm—in single and double reduction series—with 5 to 1, 15 to 1 and 25 to 1 ratios. Models for vertical or inclined shaft operation are available—as well as special-application versions such as flange mounted, right

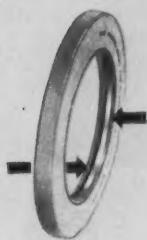
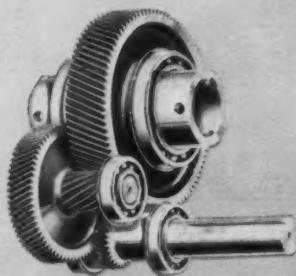


Rugged semisteel housing— a solid backbone for solid service

Here is a tough, corrosion-resistant housing with the strength to hold bearing seats in line for the life of the unit. Perfect shaft and gear alignment are assured by doweling the matched halves together and boring in line. No gear is overhung. Loads are carried easily, contributing to Torque-Arm's long life and high efficiency—97% in double reduction models, almost 99% in single!

AGMA rated gears— quality-guarded by continual tests

These helical gears have soft cores to withstand shock—and hardened surfaces to resist wear. Their quality is guarded in manufacture and assembly by the most modern methods of quality control, including inspection for runout, tooth spacing, helical lead and involute profile. They run quietly, mesh precisely. Teeth are crown shaved for maximum contact area. Gears are shrunk on their shafts to prevent shifting.



Modern double-lip seals keep oil in and dirt out

Modern synthetic, double-lip seals of the highest quality keep oil in and dirt out of the reducer case. These seals offer protection for the unit from dust and dirt and just as effectively insure cleanliness when operating in laundries, textile mills, food processing plants.

Re-ally Clicked!

angle and extended input shaft styles. Optional equipment includes a positive, sealed-in backstop and a positive overload release.

Ask your local Dodge Distributor. Or write us for our 64-page Torque-Arm Speed Reducer Bulletin, complete with engineering data and easy selection tables.

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3000 Union Street • Mishawaka, Indiana

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CALL THE TRANSMISSIONEER — your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look under "Dodge Transmissioneer" in the white pages of your telephone directory, or in the yellow pages under "Power Transmission Machinery."





Flexibility, toughness and resistance to abrasion, oils, acids, alkalies and mine water are designed and built into these Tiger Brand Cables.

Keeps machines on the job. Tiger Brand cables take constant dragging over mine floors and around sharp corners. ►



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A standard cable for every special job

- Asbestos Wire and Cable
- Mold-Cured Portable Cord
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- Paper & Lead Cable
- Varnished Cambric Cable
- Interlocked Armor Cable
- Special Purpose Wire & Cable
- Aerial, Underground and Submarine Cable

What's the difference in electrical wire and cable?

Even though electrical cables may look alike and start with some of the same materials, there's a *real difference* in the completed cables.

The difference in USS Tiger Brand Amerclad Cables results from a combination of research, engineering and construction. The development of better materials goes on constantly at American Steel & Wire. Insulation and jacketing compounds have been improved.

Better stranding designs and methods of stranding add years to cable life.

Amerclad Cables are protected by an outer jacket of Amerprene, an oil-resistant compound containing a high percentage of Neoprene. Before being vulcanized, an Amerclad Cable is encased in a substantial lead sheath that is afterward removed. The pressure developed within this rigid mold during the vulcanization process produces a dense, non-porous jacket that is highly resistant to abrasive wear.

Knowledge of severe field conditions obtained through AS&W sales engineers permits designing for special conditions.

Constant effort to control quality and improved methods of inspection assure a product of highest quality.

These are a few of the unseen plus values you get when you buy Tiger Brand Cables for your shovels, continuous miners, drills, shuttle cars and other equipment. For complete technical information, write for our free book, "Tiger Brand Amerclad Cord and Cable." American Steel & Wire, Dept. 0447, 614 Superior Avenue, N. W., Cleveland 13, Ohio.

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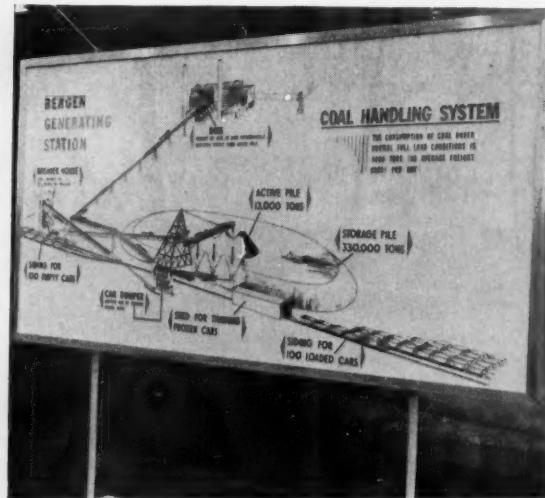


**American Steel & Wire
Division of
United States Steel**

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News Roundup



Public Service Christens New Power Plant

ONE OF COAL'S biggest northeastern electric utility customers, with capacity to burn 4,000 tons of coal daily, formally opened its new plant Sept. 20.

The customer is the Bergen generating station of Public Service Electric and Gas Co., located at Ridgefield, N. J., whose coal supplies come mainly from companies working the Fairmont Seam, W. Va. Of particular interest are fully-automated coal handling and storage facilities (see photos above), which service

most of the fuel needs of two twin-turbine generators of 290,000 kw each.

Over 80 carloads of coal have been unloaded in one day through the use of a 90-ton rotary-car dumper. Using television and radio equipment as aids, the operator can dump the coal and convey it to the breaker and then to the 13,000-ton active coal pile.

Conveyor capacity from dumper to storage pile is 940 tph. Two conveyors, from pile to plant, have normal operat-

ing capacities of 150 tph each, which can be increased to 300 tph if either is down for maintenance.

"Rail-delivered coal is the basic fuel of Bergen generating station," officials explained. "The secondary fuel is natural gas, which was burned exclusively during the startup period of the first unit. Because Bergen is not accessible to water-borne bulk delivery of oil, it is not provided with oil-burning equipment."



STONEGA COKE AND COAL CO. barbecue picnic for members of its mine management and department heads was held at the Lonesome Pine Country Club near Norton, Va., Sept. 17. Including guests, 187 persons participated in the festivities. T. J. Liddle, director of safety, was master of ceremonies and an address of welcome was given by W. C. Schott, vice president.

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UNEQUALLED MINING ACCEPTANCE!

UNRIVALLED MINING EXPERIENCE!

Scandura®

GOLD LINE

The ORIGINAL PVC MINE BELTING

First in the mining field, first in sales and performance, Scandura is the solid-woven polyvinyl chloride belting that made all the records in the beginning . . . and is building the most today! Months and years of experience on some of the most difficult applications ever assigned to conveyor belting give the crown to *Scandura* —the lighter weight, flexible, oil resistant belting certified fire resistant, immune to ply separation, mildew and rot under the worst conditions. Scandura Gold Line holds the cost line, too! See your National Mine man for quotations on your needs.

Manufactured in Charlotte, North Carolina by

Scandura
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Exclusive Distributor

National Mine
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Koppers Building Pittsburgh 19, Pa.

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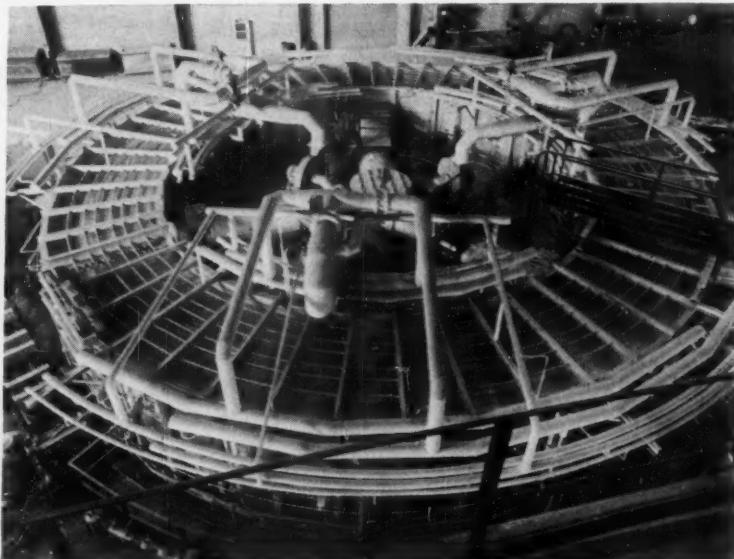
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News Roundup (Continued)

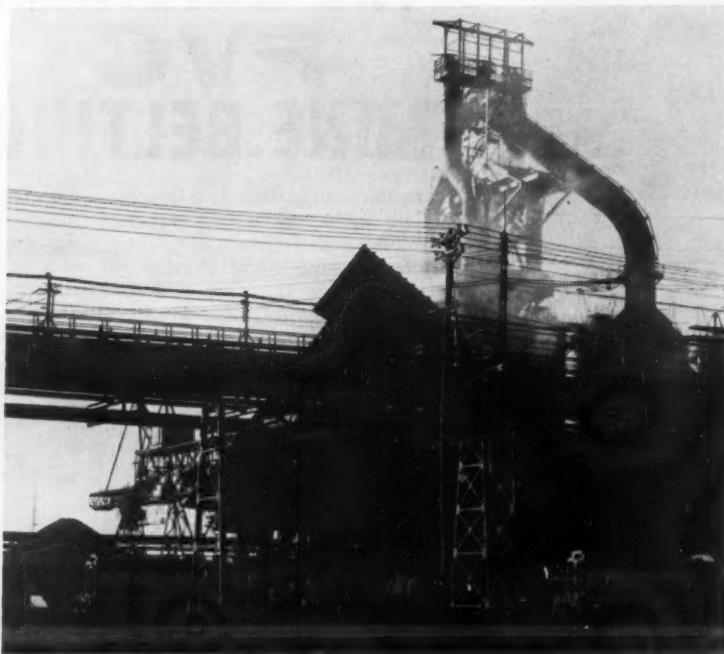
Continuous Coke Production

A NEW TECHNIQUE employing a rotary-hearth-type furnace for continuous production of metallurgical grade coke from low-grade coal has been developed jointly by Salem Brosius, Inc., Pittsburgh, Pa. and the New York Mining and Mfg. Co. of New York, N. Y. and Dorchester, Va. These firms plan to develop a pilot-type furnace immediately and later build 70-ft-dia units expected to produce approximately 5,000 tons of coke per month from an estimated 8,000 tons of coal. The new method appears to be a major breakthrough, costwise, in the effort to produce high grade metallurgical quality coke, according to the companies. Because of the nature of the method employed, recovery of by-products from the exhaust gases is possible and through proper air-cleaning equipment, the exhaust gases can be cleaned and released with no danger of air pollution. John Kemmerer, president,



and Josh Taggart, vice president, of New York Mining & Mfg. Co., indicated that the pilot production unit will be erected

on the company's property at Dorchester, Va. and will be in operation late in 1960.



Oil in the Blast Furnace

THE WORD FROM Esso Research and Engineering Co., scientific affiliate of Standard Oil Co. (N.J.), revealed last month the company has been conducting a concentrated program which promises to result in one of the most important

iron manufacturing developments in the past 20 yr.

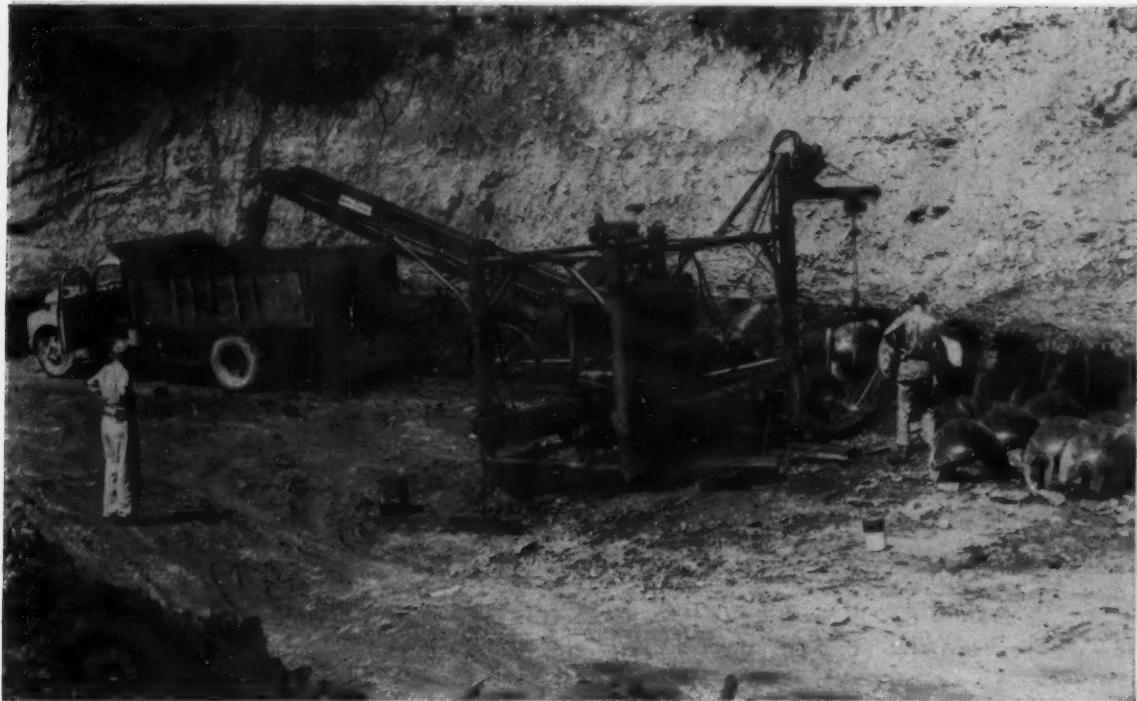
The project is aimed at proving the feasibility of a 75-year-old iron-making idea. Scientific studies and experiments have now developed the concept that

hydrocarbons, particularly heavy oil of high heat content, can be successfully injected into the bottom of blast furnaces and, in many circumstances, can increase capacity and decrease costs of "hot metal" production. Investigating the practicality of the idea, Esso Research solved the complex problems involved and developed an injection and control system which makes the idea usable.

Scientific principles underlying the new development involve taking advantage of the chemical properties of oil as well as its heat-producing ability. Blast furnaces produce pig iron in hot liquid form by extracting oxygen from iron oxide. Oil, which contains hydrogen, contributes additional "reducing" gas to speed the reduction of ore into iron. Today, coke, iron ore and limestone are fed into the top and hot air into the bottom of blast furnaces where temperatures reach some 3,500 F. With the new fueling method, oil can be injected along with the heated air and serve as part of the source of heat and of the "reducing" gases. The new fuel injection and control system must be so designed that it can be installed into large furnaces without interruption in use of the furnace.

A pilot plant simulating that part of a blast furnace most critical to oil injection was designed, built and operated by the company. A unit of this system was later installed and tested in a hot operating large-scale furnace with complete success, reports Esso.

Better products, *faster*, from your National Seal distributor:



National Oil Seals are the most positive protection against abrasive grit . . . the enemy of all bearings



Regular replacements with National Seals keep high-production machines working profitably

Special mining machines, as do all valuable production equipment in the coal industry, need the superior protection afforded by National Seals. The small investment required for regular replacements with National Seals pays off manyfold in the prevention of machine downtime and production loss.

National exclusive *Micro-Torc*[®] leather, or *Syntech* rubber, seals offer quick availability in standard sizes for any application you may have.

Call in your National Seal distributor now. He's nearby and can specify the right seals for the job.

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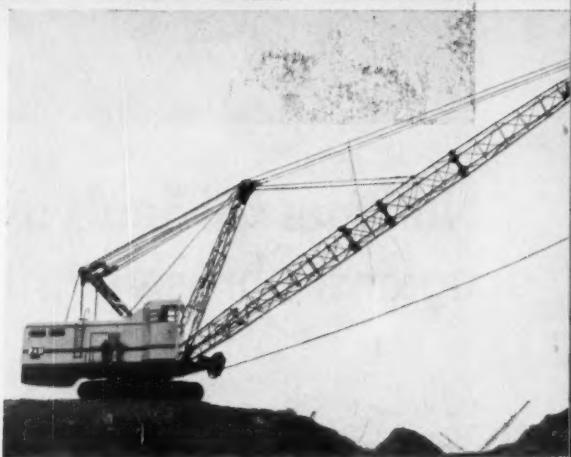
DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN



P&H stripper shovel with Magnetorque drive delivers up to 30% higher bail pull, more uniform dipper speed in the bank, faster swing motion, up to 25% faster operating cycles for more production . . . more net profit.



3 1/2-yard P&H diesel excavator features long crawlers and Magnetorque drive for swing and propel motions. Equipped with 48-ft. boom and a 34-ft. dipper handle for economical stripping operation.



P&H 1855 is fully convertible for long range dragline service. It is the largest excavator mounted on a single pair of crawlers—unmatched for maneuverability.



1 1/2-yard P&H excavator loads coal into trucks. Exclusive P&H Magnetorque drive for swing and propel motions delivers the smoothest, fastest, most accurate swings and "move ups" known in the industry.



Versatile P&H truck crane for handling material at mine siding and a variety of utility jobs. Highly mobile unit features quick, easy change-over of front end attachments—from crane, hoe, dragline, shovel, clamshell.



It pays to standardize on P&H...

P&H WITH MAGNETORQUE® DRIVE GETS DOWN TO COAL FASTER... LOADS IT OUT QUICKER

It's good business to standardize on P&H electric shovels and draglines, diesel excavators and truck cranes for all your needs . . . big, medium or small . . . There's a size and type for every job.

Full-Electric and Diesel-Electric Shovels and Draglines from 3½ to 10 yards—Big, rugged electrics that deliver up to 10% more production with exclusive MAGNETORQUE drive—the most productive work-motion drive known for mining excavators. The system that electro-magnetically transmits driving energy of the power plant (A.C. electric motor or diesel engine) direct to the work motions, without intermediate conversion to D.C. current.

Diesel Excavators from ½ to 4 yards—Workhorse machines that pay for themselves fast with increased production . . . higher job availability. Among the various models you find important bonus features—such as: Magnetorque—powered swing that delivers the fastest, smoothest swing

motion in the industry . . . Sealed Power Box design with all gears running in an oil bath, completely sealed from dust and dirt for trouble-free, maintenance-free operation . . . Quick, on-the-job convertibility from shovel to dragline service.

Versatile Truck Cranes from 12½ to 80 tons—Highly maneuverable, powerful truck cranes that keep your big crawler excavators free for production . . . Mobile units ideally suited for handling secondary road-building, refuse disposal, drainage, erection, maintenance and 101 utility jobs. . . . Truck cranes that can be changed in the field to any front-end attachment quickly, easily and without special tools.

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P&H
CONSTRUCTION &
MINING DIVISION

People in Coal



CBC Appoints VP

JAMES D. SUTTON has been appointed vice president and general manager of the Clearfield Bituminous Coal Corp., a subsidiary of the New York Central R.R. Joining Clearfield in 1938, Mr. Sutton became head of the mechanical and electrical department in 1946 and was named superintendent of mines in 1953. Three years later he was appointed general superintendent, which post he held until his recent appointment. A graduate of Lehigh University, Mr. Sutton's career with the Clearfield organization was interrupted for 5 years in 1940 when he was called into U. S. Army Ordnance.

He was recently elected director of the Central Pennsylvania Coal Producers' Association, and has also served on several committees of the American Mining Congress since 1953, presently serving on the Mine Haulage Committee.

Mr. Sutton will be replacing Timothy F. McCarthy who is retiring after a career of 47 years with the Clearfield firm. Mr. McCarthy joined the company as an electrician and from 1942 to 1945 held the post of general superintendent. In 1945 he became general manager and was named vice president and general manager in 1947.



James C. Gray has been elected 1961 president of the Society of Mining Engineers, a constituent organization of the AIME. Other officers elected include Edward G. Fox, Bituminous Coal Operators Association, eastern regional vice president, and Dennis L. McElroy, Consolidation Coal Co., Coal Division director. Presently administrative vice president—raw materials, U. S. Steel Corp., Mr. Gray is also a member of the Coal Mining Institute of America and the Advisory Council of the Coal Div. of the American Mining Congress. Starting his career in 1925, he held various positions with Hudson Coal Co. and left in 1937 to join the Tennessee Coal & Iron Div. of U. S. Steel where he advanced from superintendent of Wylam mine to

chief inspector of TCI's coal mines and superintendent of industrial relations. In 1948 he was appointed assistant manager of raw materials and two years later was named manager of the company's manufacturing operations. In November of 1954, Mr. Gray assumed the duties of vice president—coal operations.



Holly W. Sphar has been elected to the newly created position of vice president-planning and commercial development of Consolidation Coal Co. Formerly vice president and treasurer, Mr. Sphar will now be responsible for long range planning in coal and other investment opportunities including the commercialization of projects originated by the Research and Development Div.

of the company. James F. Bisset, vice president-finance, will assume Mr. Sphar's former duties as treasurer.



Carl A. Marshall, formerly vice president-sales for Warner Collieries Co., Mammoth, W. Va., has joined the engineering staff as field engineer for the eastern district of the Air Pollution Control Div. of the National Coal Association, replacing George W. Biven who resigned. Associated with the coal industry since 1929, Mr. Marshall has held engineering positions with Combustion Engineering, Inc., North American Coal Corp. and Consolidation Coal Co., and served as managing director of the Fairmont Coal Bureau.

O-B Designs For Mining Men

RESULT:

**A 4-way expansion unit that holds
in soft shale or hard rock**



4-WAY EXPANSION UNIT BUILDS HOLDING POWER FAST . . . because the flexible fingers of the shell are slightly pre-expanded to grip the wall even before wrenching begins.

GOES UP FAST AND STAYS PUT. When the bolt is shoved up the hole, the expansion unit holds the bolt in place until it's tightened . . . no need to have hands exposed to injury during wrenching.

GREATER STRENGTH IN HARD TOP . . . BETTER "PURCHASE" IN YIELDING TOP . . . because the expansion pressures are spread evenly over the four shell fingers to make the best use of the entire unit's strength. These are the reasons for the O-B Expansion Unit's popularity with mining men. It is easy to understand why more mine roof is supported with O-B Shells and Plugs than with any other kind.

For further information and prices, see your local O-B sales-engineer or write us now. **OHIO BRASS COMPANY, MANSFIELD, OHIO.** Canadian Ohio Brass Company, Ltd., Niagara Falls, Ontario.

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EXPANSION SHELLS AND PLUGS • LINE MATERIALS • SAFETY AND CONTROL EQUIPMENT • ELECTRIC HAULAGE MATERIALS

Quality . . . the best economy of all



For extra tonnage, take these two Sun products
underground . . . just these two

Sun 740-A EP, a *universal* mining machine lubricant, is the product miners have been asking for . . . an all-purpose lubricant that clings like grease, pours like oil . . . a product that eliminates *all* other products, except hydraulic fluids, for daily underground use.

Not only does Sun 740-A EP reduce underground oil inventories to two products (Sun 740-A EP and a hydraulic oil), but even more important,

these two partners in production cut maintenance costs as much as 33%, and increase tonnage by keeping equipment at the face longer.

Your Sun man has a safety hat in his car. He knows mining equipment. He knows what's good for it. Get in touch with him, or write SUN OIL COMPANY, Phila. 3, Pa., Dept. 11-CA. In Canada: Sun Oil Company Limited, Toronto and Montreal.

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES



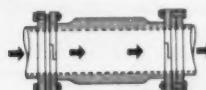
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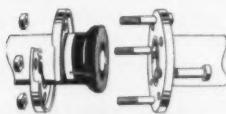
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RUBBER, NEOPRENE
for Corrosion and Abrasion

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- Pressures to 150 psi.
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- Cannot leak or stick.
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- Unobstructed flow eliminates high friction loss.
- Remote control available.
- Can be equipped for automatic regulation.



- Split flanges and patented Flex Seal ends assure perfect seal.
- Closing mechanisms... manual handwheel; handwheel with chain and sprocket reduction unit; electric worm gear motor reducer; chain operated torque arm reducer; hydraulic; air-hydraulic.

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People in Coal (Continued)

C. Millard Dodson has resigned his position as president and a member of the board of managers of Lehigh Coal & Navigation Co. A member of the board of managers since 1952, he was elected executive vice president in Feb., 1954, and president in May of that year. H. Louis Thompson who has been serving as executive vice president and treasurer, was named to succeed Mr. Dodson. Winfield S. Heil was elected vice president in addition to his duties as controller and was appointed to the board to fill out Mr. Dodson's unexpired term which runs to April, 1961.

Carroll F. Hardy, associate director of the Marketing Dept. of the National Coal Association, has been elected a Fellow of the American Society of Mechanical Engineers, an honor reserved for outstanding authorities who have made distinguished contributions to the advancement of engineering. This honor was bestowed upon Mr. Hardy in recognition of his achievements in the technology of coal utilization that have benefited fuel users, community relations and the national effort to conserve natural resources, and particularly his direction, staffing and administration of Bituminous Coal Institute which has been incorporated in the reorganized National Coal Association. He has also held positions as chief engineer of Appalachian Coals, Inc. and fuel engineer to the Coal Producers Committee for Smoke Abatement and was a member of the National Fuel Efficiency Council during World War II.

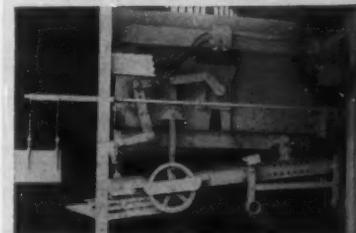
Edwin R. Phelps has been appointed chief engineer of Peabody Coal Co., St. Louis. Recently resigned from Pittsburgh & Midway Coal Mining Co., Mr. Phelps will be in charge of mining engineering, exploration and development of new mines for Peabody. C. P. Arnold, vice president and chief engineer, has been named vice president and director of engineering for Peabody.

H. Rembrandt Woolridge, Woolridge Coal Co., Clearfield, was named president of the Central Pennsylvania Open Pit Mining Association at its annual meeting at Philipsburg on Sept. 29. R. G. Kuhns, retiring president, was appointed chairman of the board, a newly created position. Other officers reelected were: Robert Bailey, vice president; Ray S. Walker, secretary; and C. Arthur Rydberg, treasurer.

Members of the Smokeless Operators Association elected James B. Wooldridge Jr. as secretary to succeed the late B. B. Housman. At the group's annual meeting in Bluefield, W. Va., other officers reelected were: president, S. Austin

(Continued on p 50)

NOLAN E-Z-TILT Wheel Activated PANS use 300% LESS FORCE!



**-more efficient
mechanical loading
operation assured!**

Other special

NOLAN

advantages include:

**Large Hopper No Spillage
90° Pan Travel Ample Surge
Capacity**

Quick Installation and Movement

**Automatic Uniform Trip Loading
Without Stopping or Spilling
on All Types of Cars**



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Frank C. Mamott, P.O. Box 154, Castle Gate, Utah
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THE NOLAN COMPANY
106 Pennsylvania St. Boverton, Ohio

Current Coal Patents

By Oliver S. North

Mine roof bolt installation, J. B. Dempsey, Sept. 13, 1960. Design for a mine roof bolt installation having improved means for retaining a grouting material therein prior to its hardening. This retaining means is activated into positive sealing engagement with the wall of the mine roof hole in response to the expansion of the anchoring means of the roof bolt assembly. U.S. Bureau of Mines Patent No. 2,952,129.

Specific gravity measuring device, J. E. Hayden, Jr., and G. R. Pitmon (assigned to The Cleveland-Cliffs Iron Co., Cleveland, Ohio), Sept. 13, 1960. Process and apparatus for continuously determining the density of suspensions, particularly suspensions of ferrosilicon and magnetite in water used in heavy media operations of coal and ore beneficiation processes. Control over density is maintained wholly on an empirical basis. No. 2,952,157.

Heavy solid mixture classification, J. W. Murry, Sept. 31, 1960. In the classification of mine-run coal in a mixture of sand and water, an improved separating compartment makes possible increas-

ing the maximum specific gravity of the media within the compartment and effecting a substantially uniform specific gravity throughout the entire body of the float media within and below the separating compartment. No. 2,952,359.

In situ exploitation of lignite using steam, H. Purre (assigned to Phillips Petroleum Co., a corp. of Del.), Sept. 13, 1960. In the combustion of lignite in situ, a process is provided for raising the permeability of the stratum and simultaneously producing hydrocarbon material therefrom. The stratum is fractured by injecting steam at elevated pressure and then suddenly releasing the pressure. No. 2,952,450.

Process for initiating in situ combustion, D. E. Carr (assigned to Phillips Petroleum Co., a corp. of Del.), Sept. 20, 1960. In the combustion of coal or other carbonaceous strata in situ, liquid hydrazine is introduced into the stratum and decomposed, e.g. with ultra-violet light, to heat the mineral. Oxygenous gas is then introduced so as to ignite the hot carbonaceous material. A catalyst may be added to the hydrazine to lower its temperature of decomposition. No. 2,953,205.

Mine haulage vehicle, A. L. Lee (assigned to Consolidation Coal Co., Pittsburgh, Pa.), Sept. 20, 1960. A liquid control system for a mine shuttle car is arranged to energize several components simultaneously without a large liquid pressure loss. A supplemental supply of liquid under pressure is made available when the vehicle is traveling and liquid pressure demands are relatively high. No. 2,953,212.

Two-part mine prop, W. L. G. Heusner (assigned to Hermann Schwarz K.G., Wattenschied, Germany), Sept. 20, 1960. Design for a metallic two-part mine prop in which the elastic deformation of the locking elements will be about the same with all props installed at the same working station, and the prop members will be held in their final set positions by a mechanical latching mechanism. No. 2,953,343.

Coal drying furnace breeching, G. P. Reintjes, Sept. 20, 1960. In an air heating furnace for the drying of coal, means are provided for feeding larger volumes of air than is usually possible, such air being mixed with hot gases to lower the temperature of those gases and prevent stratification, or the production of relatively cool and hot spots. The additional air is admitted through the breeching of the furnace. No. 2,953,364.

Tension control apparatus for belt storage loop of an extensible belt conveyor, J. J. Slomer (assigned to Goodman Mfg. Co., Chicago, Ill.), Sept. 27, 1960. An improved hydraulic circuit is provided for maintaining proper tension on a head end storage loop, whereby a belt tail section remote from the loop may be moved towards the working face by releasing hydraulically operated cable winch. No. 2,954,114.

Screw wedge, A. O. Zatur (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Sept. 27, 1960. Design for a threaded wedge cone material core bursting means so mounted with respect to a hole developing tool and with respect to the core developing means as to permit core build up before forcibly engaging and then rapidly advancing into and bursting the core as determined by cone rotation and the lead of the cone thread. Power requirements are lessened. No. 2,954,219.

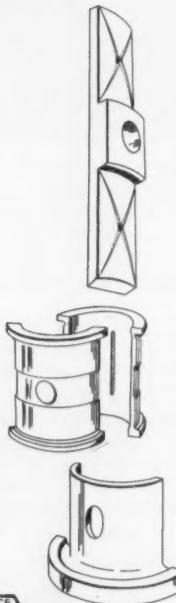
Side cutting mining head for continuous mining machine, E. R. Bergmann (assigned to Goodman Mfg. Co., Chicago, Ill.), Sept. 27, 1960. Improved side cutting mining head of the auger type, in which the cutting diameter of the auger may be readily varied. No. 2,954,220.

(Continued on p 38)

for that extra long hard wear FLOOD CITY #21 Bronze PARTS . . .

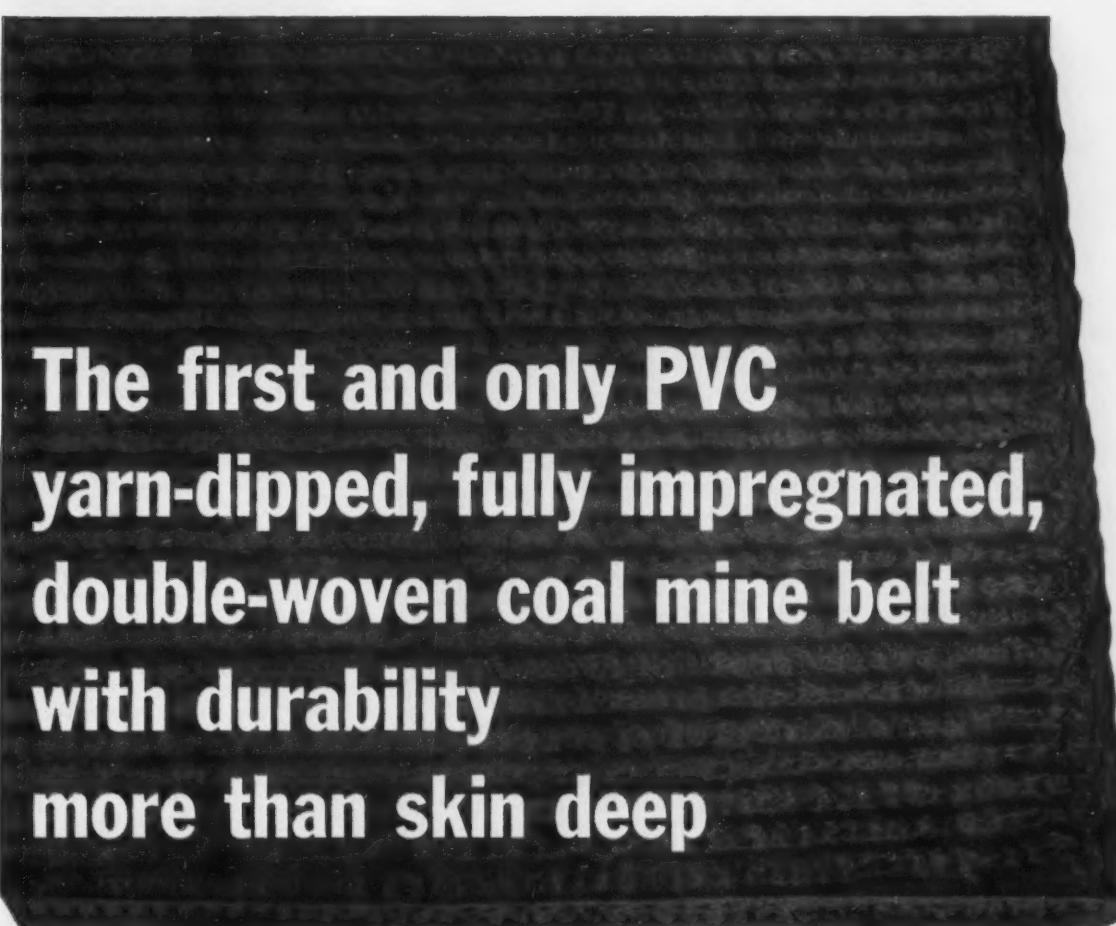
- If wear-resistance is the problem, then Flood City #21 Bronze Parts is the answer! Flood City #21 Bronze backs up proven long life ability with accurate precision fit because Parts are expertly machined to exact specifications. And they cut downtime for replacement!
- For years Flood City has furnished quality Bronze Parts to a variety of industries at a savings in metal weight and machining costs.
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introduces revolutionary "Plasticoal"



The first and only PVC yarn-dipped, fully impregnated, double-woven coal mine belt with durability more than skin deep

All the disadvantages of short life, slippage, stretching and rotting of conventional light-weight coal mine belts have been overcome by the revolutionary Thermoid-Quaker "Plasticoal" belt.

In contrast to conventional double-woven cotton fabric covered with neoprene, new "Plasticoal" is impregnated through and through with Polyvinyl Chloride . . . even the yarn is PVC dipped before it is woven. Nylon cords are added, in both directions, to provide extra strength and the entire impregnated carcass is heat-set under tension before the final dip and heat-set.

For underground mine safety, USBM 28-11 "Plasticoal"

is flame retardant and flame resistant. It's lighter in weight and more flexible for ease of handling underground. The rough surfaces give better material traction, less slippage, yet require less tension. And being completely impregnated with PVC, the "Plasticoal" carcass carries the load long after the cover is worn away. Even extreme edge wear will not put "Plasticoal" out of commission.

Mine-orange "Plasticoal" is available from stock in 26", 30" and 36" widths, up to 600' lengths or longer on request. See your Thermoid Division Distributor for all the advantages of new "Plasticoal." Or write *Thermoid Division, H. K. Porter Company, Inc., 200 Whitehead Road, Trenton 6, New Jersey.*

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Call it popularity, call it efficiency, call it good design. Whatever you name it, Wedge-Wire has that vital quality that builds performance into screens and confidence into customers.

Kleenslot preparation screens are designed for vibrators or stationary applications for dewatering, screening, washing, extracting, filtering or sizing applications.

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Coal Patents (Continued)

Flight conveyor, A. L. Lee and A. B. Coval (assigned to Consolidation Coal Co., Pittsburgh, Pa.), Oct. 4, 1960. In an improved conveyor mechanism for a mine haulage vehicle, the transverse conveyor flight elements can be removed and replaced without dismantling the endless chain portion of the conveyor. Each element has an end portion telescopically positioned within the conveyor flight body portion. No. 2,954,864.

Separation of solids, J. R. Pagnotti and S. Barron (assigned to Mineral Processing Corp., Dover, Del.), Oct. 4, 1960. Heavy media apparatus and method for coal in coarse sizes, e.g. in the $\frac{1}{2}$ -inch to 6-inch range. Either a suspension of finely divided magnetite or ferrosilicon or a true liquid may be used. Light and heavy fractions are removed hydraulically, and the sink fraction is discharged without effecting fluid flow conditions in the cone. A uniform specific gravity is maintained by non-mechanical means. No. 2,954,870.

Fluidized carbonization process for agglomerative coals, I. H. Welinsky (assigned to Consolidation Coal Co., Pittsburgh, Pa.), Oct. 4, 1960. In the fluidized carbonization of agglomerative coals, the bed is held at 725-825 deg F for at least 5 minutes, and then raised to a temperature higher than 825 deg F. The amount of inert solids needed to be added to the coal is substantially reduced. No. 2,955,077.

Coming Meetings

International Symposium on Mining Research, sixth of a series, Feb. 22-25, 1961—University of Missouri, Rolla, Mo.

Coal Mining Institute of America, 74th annual meeting, Dec. 15-16, 1960—Penn-Sheraton Hotel, Pittsburgh, Pa.

National Conference on Water Pollution, Dec. 12-14, 1960—Dept. of Health, Education, and Welfare, Washington 25, D. C.

Anthracite Conference, technical and scientific aspects of anthracite utilization, Nov. 15-16, 1960—Pennsylvania State University, University Park, Pa.

American Mining Congress, coal division conference, Nov. 18, 1960—Penn-Sheraton Hotel, Pittsburgh, Pa.

AIME Annual Meeting, Feb. 26-Mar. 2, 1961—Ambassador and Chase-Park-Plaza Hotels, St. Louis, Mo.

Hold fast in mine roof



Ohio Brass 4-Way Expanding Anchors hold in both soft shale and hard rock

- **GO UP FAST** . . . 4-way expansion begins with the first turn of the wrench.
- **DEVELOP TOP HOLDING POWER** with easy wrenching effort . . . 150 "foot pounds" of torque gives bolt tensions of 9000 pounds.
- **WORK IN CLOSE QUARTERS** . . . O-B engineers developed these anchors underground. Personal knowledge of mining problems enabled them to design units that are especially suited to your needs.
- **GET SERVICE** for your roof bolting problems . . . see your local Ohio Brass engineering representative or write Ohio Brass Company, Mansfield, Ohio.



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EXPANSION SHELLS AND PLUGS • LINE MATERIALS • SAFETY
AND CONTROL EQUIPMENT • ELECTRIC HAULAGE MATERIALS

To:
Mr. Charles Maynard
Mine #3

Chuck:

This is the shell I talked to you about last week at the mine. Roof bolting is right up O-B's alley...they pioneered the use of expansion units... probably know more about them than anyone in the field. I suggest you get in touch with their local sales engineer. I've found Ohio Brass people are glad to work right with you in the mine.

Regards,
Jack

Coal Abroad

French Pithead Stocks Mount

CHARBONNAGES DE FRANCE
French coal authority, at the end of September made the second in a series of belt tightening moves aimed at trimming French coal production to 53 million metric tons per year by 1965 from almost 60 million tons produced in 1959.

As a first move, miners who have worked for 30 yr, entitling them to full pensions, are already being retired in some basins. Mounting pithead stocks and sluggish sales have necessitated this action.

Under the terms of an agreement be-

tween Charbonnages de France and the miners' union, France's 230,000 miners will get an extra 15 days off a year—six of these to be paid holidays. The remaining nine days will be compensation for an extra quarter of an hour's work on normal working days, bringing the miner's day to 8 hr from 7½. Previously, French miners have had Sundays off, plus 11 holidays per year.

Reversing its former policy of full production, rock-bottom imports and stockpiling, the decision to diminish production gradually between 1960 and 1965 was made this summer by the French government. Curtailing of production will be achieved mainly through shutting down marginal mines in central and southern France.

Most recent information describes French production as follows: 4,783,200 metric tons in September as compared to 4,230,500 in August. However, Sept. 1960 production was 193,200 tons under Sept. 1959 figure of 4,976,400. There were 26 working days in all three months. Number of miners employed in September was 128,430 compared to 130,740 in August. Output per man shift thus rose to nearly 2.01 tons (U.S. tons) per 8 hr in September compared to 1.94 in August and 1.92 in Sept. 1959.

Overseas Flashes

RUSSIA—Soviet scientists are said to be working on a method for using nuclear radiation for automatic control of mining machines. A "counter" containing the radioactive source within a lead body, as well as calculating tubes and other instruments, is installed close to the cutting component. The beam of gamma rays flowing from the lead chamber through a cone-shaped channel encounter the coal, and radioactive particles then are registered as they reach the tubes which in turn create electrical impulses, according to the report. When these impulses pass through special instruments, signals appear, automatically regulating the position of the cutting body and directing its movements.

WEST GERMANY—Ruhr coal mining industry is considering construction of a coal pipeline from the Ruhr via Fulda A Erlangen to Regensburg (Danube). A consortium, formed for planning the project, has secured cooperation of the Consolidation Coal Co., Pittsburgh, whose 110-mi-long coal pipeline in Ohio cut coal transport cost by one-third compared to rail transport. The proposed German pipeline would be about 300 miles long, 15 in in diameter and have an annual transport capacity of roughly 3 million metric tons.

GREAT BRITAIN—Statement issued by the British Labor Party and Trades Union

For
BIG SAVINGS
in
Time and Labor
Maintenance Expense
Installation Cost

Check These
Features of the

STAMLER
Automatic TILT PAN

- It automatically loads entire trip without belt stoppage or spillage between cars.
- It permits use of boom man on productive face jobs.
- It provides uniform car loading without an attendant.
- It can be quickly installed and easily moved.
- It operates with existing car spotters without special hydraulic power units.
- It operates with non-uniform car lengths.
- It is self-adjusting for dented car bodies.
- It automatically shuts down without spillage if the last empty car becomes loaded.
- It fits into the same head room as manually operated flygate chute.
- Fail safe under any emergency.

Get all the facts on the STAMLER Automatic Tilt Pan. Write today for folder.

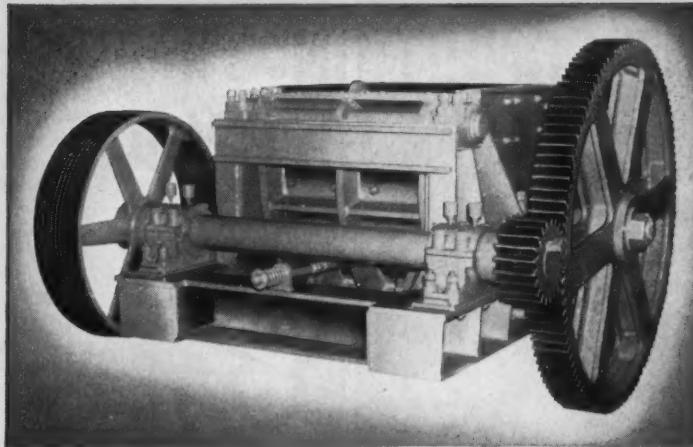
STAMLER
Automatic
TILT PANS

W. R. STAMLER CORPORATION
PARIS, KENTUCKY

SCHROEDER BROTHERS, Exclusive Eastern Sales Agent
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PENNSYLVANIA HERCULES

New job-proved single roll crusher brings you lower operating, maintenance costs

Pennsylvania has researched the factors that make single roll



Cast alloy steel roll shell is made in one piece and keyed as well as shrunk on the rollshaft. No segments or renewable teeth to loosen or fall out. Readily accessible teeth are easily built up by welding.

crushing costs mount—and come up with a new machine specifically designed, and *job-proved*, to keep costs down.

Here are just a few high spots of this great new crusher:

- Hopper jams are prevented by the larger hopper opening and spacious throat opening made possible by the contour of the breaker plate.

New automatic toggle release

supplies positive release mechanism for breaker plate. New design of countershaft placement, plus large diameter of the gear improve stress distribution on countershaft bearings.

Hercules bearings are away from the frame. Easy to get at, easy to maintain.

Breaker plate is heavy steel fabrication lined with cast manganese steel wearing plates; guaranteed against cracks and flaws.

If you have a job where a single roll might be used, find out more how this new Pennsylvania Hercules will save you money in more ways than one. Send for new Bulletin 2020.



PENNSYLVANIA CRUSHER DIVISION
BATH IRON WORKS CORPORATION
WEST CHESTER, PENNA.

Over 50 years concentrated experience in all types of material reduction makes Pennsylvania your best source of crushers and engineering advice and service. Call on Pennsylvania with your next crushing problem. Representatives from coast-to-coast.

PENNSYLVANIA
CRUSHERS



IN ANY SEAM
OR PIT CONDITION
COMPTON AUGERS GIVE YOU
THE LOWEST COST PER TON



The complete range of Compton's line of augers—from 20" triples to 8' singles—means a low cost per ton can be achieved in any seam, under any pit conditions. The percentage of good coal is very high, too, for all models are equipped with Compton "lump recovery" cutting heads.

Compton Augers are designed for "high-ball" oper-

ation and quick shifting of locations. They are completely self-contained. Auger sections are racked up within the machine frame, ready for quick transfer to operating position, by means of the hydraulically controlled, synchronized winches. The elevating conveyor is an integral part of the auger. All models are available with a self-propelling feature.

For full information on how to cut your highwall mining costs with Compton Augers, write for literature or consult your Joy representative.

Compton, Inc.
SUBSIDIARY OF JOY MANUFACTURING COMPANY
BOX 1946—CLARKSBURG, WEST VIRGINIA

News Roundup (Continued)

Congress urges that "taxation of fuel oil, deliberately lifted during the acute coal shortage of 1947, should be restored. Coal is not only a cheap and efficient fuel but it is the one source of fuel supply which the nation has completely under its own control. To rely complacently on imported oil as the government is doing is to expose the economy to two dangers; foreign supplies of oil might be seriously reduced as they were after the Suez crisis; and the nation . . . might be unable to afford ever-increasing quantities of imported fuel."

AUSTRALIA—Coal, the country's most abundant mineral resource, is beginning to regain some of the export trade it lost years ago through high production costs. Principal market is Japan, where exports during 1959-60 are expected to total 926,000 tons compared with 375,000 in the previous year. These figures signify a revival for the Australian coal exporting business. The Japanese steel industry has shown particular interest in the coking coals of New South Wales and recent developments indicate Australia will become an important supplier of coal to Japan.

INDIA—A birth control program has been launched by India's coal mines labor welfare fund organization. The program offers cash awards to coal miners who voluntarily undergo sterilization.

HUNGARY—The Hungarian News and Information Service reports discovery of a new coal deposit estimated at nearly 700,000 tons at Matraszele, in northern Hungary. Stated to be better in quality than the brown coal mined in the Nagrad coalfields, the coal will be worked by opencast mining.

BELGIUM—At the insistence of the High Authority of the European Coal and Steel Community, the Belgian National Coal Board ordered the closing of 11 mines next year. The action was ordered in the face of a political demonstration in Brussels and a strike of 10,000 workers in the coal regions. Belgium's older coal mines in the Borinage region have long received government subsidies to keep operating but the coal board has now voted to gradually reduce subsidies over the next 3 yr and then end the subsidy system entirely.

JAPAN—A gas explosion in a neighboring pit in Sept. was reported to have caused the ground to sink in a coal mine at Kawasaki in southern Japan. As a result, the mine was flooded to a depth of 35 ft by the Chuganji River, thereby trapping 67 miners, for whom hope has been abandoned.



GUNDLACH Takes the Crushing Problem DOWN TO SIZE!

YOU BENEFIT...

By Control of Top Size—Crushing to size in one operation eliminates recirculating load . . . saves time and equipment . . . increases overall plant capacity.

By Less Fines—More saleable coal in stoker sizes means more dollars per ton . . . if crushing prior to washing, fewer fines means lower washing costs.

By Flexibility . . . Can handle larger lumps and frozen coal . . . hand wheel adjustment allows you to fill any order down to $\frac{3}{4}$ " top size . . . orders heretofore uneconomical to fill are now yours.

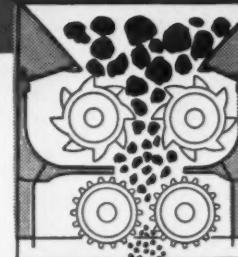
By Dependability . . . Ever-increasing list of satisfied users.

By Economical Operation . . . Less maintenance . . . less H.P. per ton of crushed coal . . . One Crusher . . . Lower initial investment . . . No wasted labor in adjusting crusher.

YOUR CUSTOMER BENEFITS...

By Control of Top Size . . . Less unburnt coal in ashes . . . More BTU output per ton . . . Lower ash handling costs . . . Greater overall utilization.

By Less Fines . . . Simplifies unloading . . . increases boiler efficiency.



Uniformity in size consists of GUNDLACH crushed coal eliminates customer complaints, gives customer satisfaction, and increases production.

If you have a crushing problem, you'll find a GUNDLACH representative as near as your telephone.

OUR REPRESENTATIVES AT YOUR SERVICE

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MACHINE CO.**

P.O. BOX 283 • BELLEVILLE, ILL.

Division of J. M. J. Industries



Two Gulf® lubricants replace five, lengthen machinery life

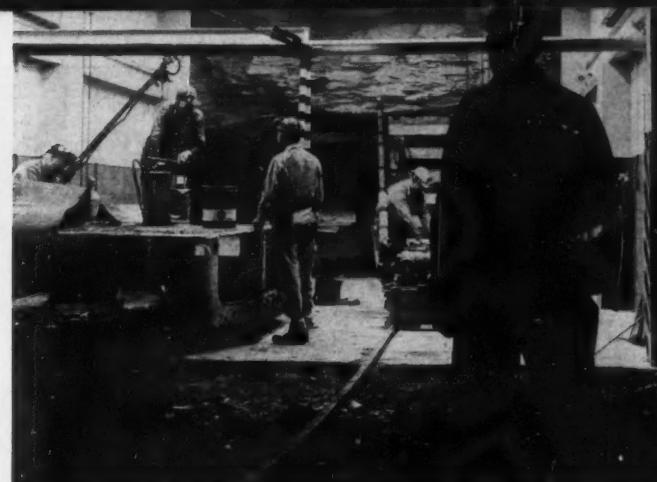
GULF MAKES THINGS

Ten to twelve years ago, Amherst Coal Company's Paragon Slope Mine, at Slagle, West Virginia, used five different lubricants on face equipment. Too many lubricants were like too many cooks: cylinder oil was accidentally poured into a hydraulic system, and a semi-fluid grease was mixed with hydraulic oil. These mistakes caused interruptions. And the mine's production schedule suffered.

Gulf engineers were called in. They suggested a simple lubrication program for all face equipment: Gulf Harmony® oil for hydraulic applications, and one multi-pur-

pose grease—Gulf® Mining Lubricant B—for all lubrication purposes. After seven years of successful operation, Amherst switched to new Gulf® Mining Lubricant H.D. This improved grease combines the multi-purpose advantages of the previous lubricant with new heavy-duty characteristics. It has high resistance to water, heat and extreme pressures—ideal for high-speed, mechanized operations.

This program is now in effect in three other Amherst Mines. Equipment lasts much longer.



This new maintenance shop is 265 feet underground. It's handy. Compact. Equipment can be serviced quickly.



Left to right: F. C. Robert, Gulf Product Application Engineer, J. P. Poling, Gulf Sales Engineer, and Rethel Edwards, Mine Manager, discuss lubrication schedules for running equipment.

◀ This loader and other face equipment at Paragon Slope are protected with Gulf Mining Lubricant H.D. This lubricant, along with hydraulic oil, takes care of all petroleum product requirements at the face.

and cut maintenance costs . . . **RUN BETTER!**

Abra Chaney, Division Superintendent, puts it this way. "The use of one basic lubricant eliminates the chance of error. It also speeds up lubrication, because one gun takes care of all equipment. No doubt about it, our maintenance costs are lower."

Try new Gulf Mining Lubricant H.D. on *all* underground equipment. You'll see how Gulf makes things run better! It's available in 35-lb. pails or 120-lb. drums. For fast service, call your nearest Gulf office. Meantime, fill in the coupon and send for our free booklet.



GULF OIL CORPORATION

Dept. DM, Gulf Bldg., Houston 2, Texas

Send free booklet on new Gulf Mining Lubricant H.D.

Name

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Protect your coal and your equipment Use Morton "Formula 5" with rust inhibitor

"Formula 5" is the safest, most effective freeze proofing compound you can buy

Effective even at sub-zero temperatures, "Formula 5" not only keeps coal free-running for customers, it also is an ideal de-icer for tracks, switches, walks—wherever freezing presents a problem.

"Formula 5," with a new, easily distinguishable blue color, is specially made to meet the requirements set up by coal producers. And, unlike ordinary freeze proofing compounds, "Formula 5" has a rust inhibitor added to protect you and your customers against corrosion of cars, motors, conveyors and other equipment.

"Formula 5" needs no mixing, no special handling. For more effective, more economical freeze proofing, "Formula 5" is treated to produce an ideal dissolving rate and you just apply it dry, direct to coal. "Formula 5" won't cause costly delays by lumping or caking in feeders.

A free-flowing product, "Formula 5" is composed of chemically treated sodium chloride (30-70 mesh) and a special new improved anti-corrosive compound.



Write for free booklet, "The Key to Low Cost Effective Freeze Proofing." If you would also like a Morton representative to assist you with freeze proofing and equipment maintenance problems, without cost or obligation, write:

**MORTON SALT
COMPANY**
INDUSTRIAL DIVISION

Dept. C11, 110 N. Wacker Drive, Chicago 6, Illinois



News Roundup (Continued)

Competition

Commonwealth Edison Co.'s 180,000-kw Dresden Nuclear Power Station, dedicated on Oct. 12, is the largest nuclear power station operating anywhere in the world and is the Nation's first privately-financed, full-scale atomic power plant.

General Electric built the plant under a fixed-price contract which, in this instance, meant a financial contribution (rumored at \$13 million). Nuclear Power Associates, a group including seven electric utilities, invested \$15 million for research and development. Commonwealth Edison's investment was \$30 million for the plant and \$6 million for the site.

The reactor vessel contains a core loading of uranium fuel valued at about \$15 million for fuel and fabrication. This initial loading, weighing about 65 tons, will produce as much electricity as 2 million tons of coal. Basing estimates on their investment, Commonwealth hopes to produce power at a cost close to that of their conventional coal-fired steam plants.

Dresden represents a giant step forward in the development of peacetime uses of atomic power. Realistic competition with coal, however, still seems to be many years ahead. If the investment in research and development, the cost of the plant site, and the value of the fuel was considered, cost of generation would be estimated considerably higher. One view is that after some 2 to 3 yr of operation, principally for results in the area of research, Dresden will operate only as a peaking station.

Ash Removal

A new packaged ash-handling unit, known as the "Econo-Ash" system, has been designed and developed by the Allen-Sherman-Hoff Co. Specifically designed and priced for the small, coal-burning plant of two to four boilers, the new system offers advantages typical of those attained at an installation at Our Lady of Fatima Institute in Elmhurst, Pa., reports the company. Prior to the installation, ash had to be raked from the boiler ash pit, shoveled into tote cans, carted to the stairwell and then hoisted by pulley to ground level where the ash was stored until disposal. Now the ash is raked from each boiler ash pit onto a flat anvil plate and into an intake in a pipeline running in a concrete trench under the plate. A vacuum created in the piping by means of a mechanical exhauster transports the ash through the boiler room piping, up a vertical line to a special steel silo (other

types available) on ground level. Discharge is made into a primary ash collector and a secondary collector atop the silo. Ash drops by gravity from these collectors into the silo. Conveying air passes through a bag filter before it enters the suction of the exhauster and is discharged to atmosphere. The steel silo which will provide about 15½ days' storage, has water nozzles for wetting the ash prior to discharge through the manually-operated gate into a disposal truck. A typical system for a 2-boiler installation would cost about \$6,500, the company reports.

Safety

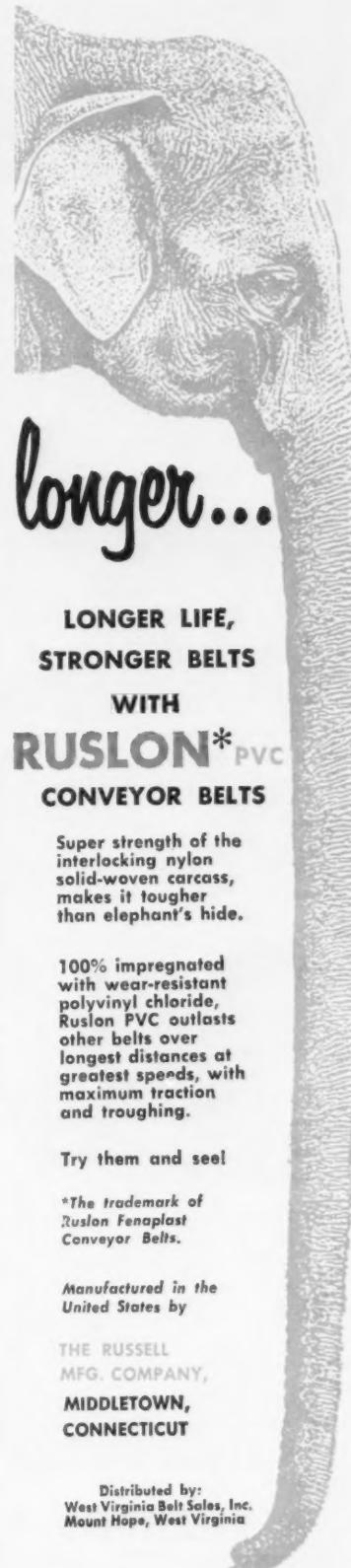
Inland Steel Co.'s Wheelwright mine team, captained by James Blevins, took top first-aid honors in the statewide Safety Day Contest at Cumberland Falls, Ky., Oct. 1. Second place in the first-aid division was won by Blue Diamond Coal Co., Leatherwood, Ky. and third place went to Turner Elkhorn Mining Co., Drift, Ky. Mine rescue honors were won by U. S. Steel Corp., Lynch, Ky. for first place; Wisconsin Steel mine, U. S. Steel, Benham, Ky., second place; and Republic Steel Corp., Elkhorn City, Ky., third. First and second place winners in each division were awarded trophies by Mine Safety Appliances Co. Underwriters Safety and Claims Co. awarded trophies to first and second place winners in mine rescue; and first and second place first-aid trophies were awarded by Old Republic Insurance Co. and Coal Operators Casualty Co. The contest was sponsored by the Kentucky Mining Institute through the cooperation of the Big Sandy-Elkhorn Coal Mining Institute, Harlan Mining Institute, Western Kentucky Mining Institute and the Kentucky River Mining Institute, and various agencies.

Forecast

The National Coal Association Market Forecast Committee last month estimated production of U. S. bituminous coal in 1960 at 420 million tons and predicted an output of 423 million tons in 1961. Actual 1959 tonnage was 412 million.

Coal's biggest customer—the electric utility industry—is expected to consume 175 million tons of coal in 1960 and 185 million in 1961. Coking coal, principally for the steel industry, is expected to account for 84 million tons in 1960 and 83 million in 1961.

The committee estimates other industries will use 90 million in 1960 and 88



longer...

**LONGER LIFE,
STRONGER BELTS
WITH
RUSLON* PVC
CONVEYOR BELTS**

Super strength of the interlocking nylon solid-woven carcass, makes it tougher than elephant's hide.

100% impregnated with wear-resistant polyvinyl chloride, Ruslon PVC outlasts other belts over longest distances at greatest speeds, with maximum traction and troughing.

Try them and see!

*The trademark of Ruslon Fenoplast Conveyor Belts.

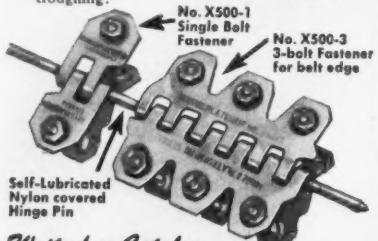
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Recommended for mines, quarries, construction work, storage yards — wherever belts length must be frequently changed. Hinged Plategrid Fasteners make a strong, flexible joint in heavy duty conveyor belts, trough naturally, ride smoothly over pulleys, yet can be separated by simply pulling the hinge pin. Improved design takes the new smaller diameter self-lubricating nylon sheathed cable hinge pins. No. X500-1 single bolt fasteners and No. X500-3 3 bolt fasteners (used at outside edges) to reinforce edges and aid troughing:



Write for Catalog
ARMSTRONG-BRAY & COMPANY
53-0 NORTHWEST HIGHWAY • CHICAGO, ILLINOIS

in '61. Retail deliveries of coal were forecast at 33 million tons this year and 31 for 1961. Shipments of U. S. coal to Canada were expected to be 12 million tons in each of the two years while overseas exports were forecast at 26 million tons for 1960 and 24 million for 1961. The Forecast Committee based its prediction on economic conditions continuing at about the present level through 1961.

'61 AMC Coal Show

An industry-wide committee representing every major coal-producing area of the nation has been named to draft the program for the 1961 Coal Convention and Exposition of the American Mining Congress May 15-18 at Cleveland, Ohio, according to an announcement by R. E. Salvati, president, and J. D. Conover, executive vice president of the American Mining Congress. More than 15,000 mining men from the U. S. and many foreign countries are expected to attend. The convention-exposition's participants will review technical progress being made in the industry and discuss ways and means of improving production methods, efficiency and safety. F. Stillman Elfred, chairman of the board, Peabody Coal Co., St. Louis, Mo., will head up the AMC "Coal Show" committee.



Now you can weld rail joints Easily— Quickly— Cheaply!

Thermit Welding is now the simplest and speediest of all rail welding methods — just line up rail ends, fasten on a pair of molds, pour in and ignite the Thermit, and, move on to the next joint. Five or six minutes is all it takes to make a strong, sound weld that will stand up indefinitely in main haulage track; always have 100% conductivity. With modern Thermit Welding, no time is lost in preheating rail ends prior to welding — there's no heavy equipment to haul into the mine. Materials come in "Self-Weld" kits, each kit containing everything needed to make one weld. And, the cost is amazingly low — compares favorably with that of bolted joints with bonds. Write for more information.

Thermit Rail Welding

Thermex Metallurgical, Inc., Lakehurst, New Jersey

Mine-Voids Study

Steps have been taken by the U. S. Bureau of Mines and the Army Engineers towards the study of the mine voids under Wyoming Valley for which \$450,000 was appropriated by the last session of Congress. There has been tentative agreement on the first tasks to be undertaken in the effort which will give Wyoming Valley its first authentic and unprejudiced report on just what has been done underground by mines and water, and then show where danger might lie and what can be done. The first phases which probably will be undertaken in the study which will require several years to complete are as follows: (1) studies of the underground areas beneath the Susquehanna River; (2) studies of areas under flood control structures; (3) examination of underground areas along the river around Plainsville to determine if flood threats could cause sufficient damage to mines to justify construction of the \$1.5 million dike which Congressman Flood has been endeavoring to have the government construct there; (4) study of specific danger areas—not yet decided upon—in regard to possible surface subsidence problems, how they are caused or may be caused by water conditions which existed before the Knox disaster and which exist now. Main purpose of the mine-void study is to provide an unusual service for the entire Wyoming Valley to show just what is the actual condition underground, where threats exist, what the threats are and what can be done about them. It will be the first government-sponsored study of its kind ever conducted.

Rate Cuts Approved

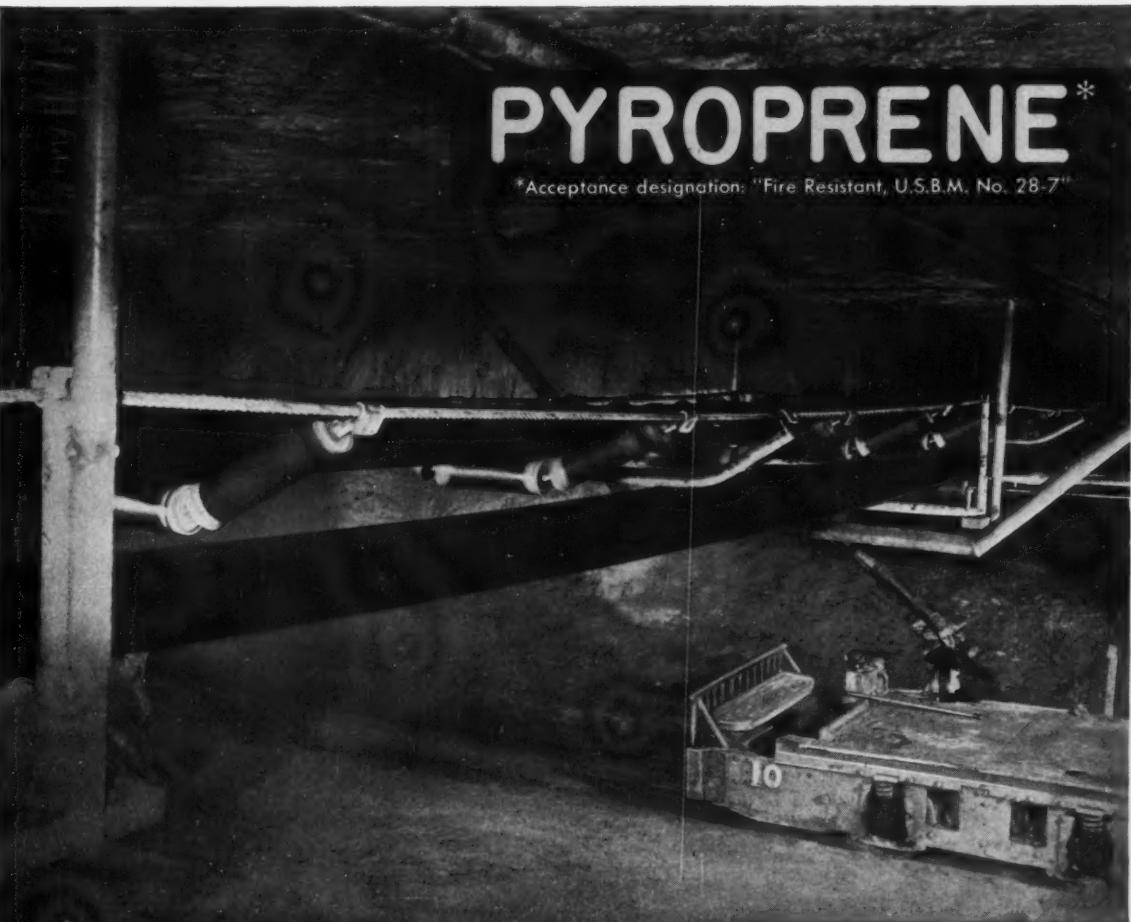
The Interstate Commerce Commission recently handed coal a major victory by approving conditional reduced rates on bituminous coal to electric utilities along the Eastern Seaboard. The reduction, 50c a ton on coal in excess of certain minimum annual tonnages from the Appalachian field, were announced last year to meet competition of imported residual oil. The 48 utilities involved require about 20 million tons a year and it is estimated the reductions apply to about half this coal. In its decision, the ICC noted that barge and lake shipping interests feared such rate would give the railroads a weapon to destroy them.

Mines, Companies

For some time the board of managers of the Lehigh-Boone Bituminous Corp., Bethlehem, Pa., has been considering withdrawal from the bituminous mining

PYROPRENE*

*Acceptance designation: "Fire Resistant, U.S.B.M. No. 28-7"



Here's one overhead that runs up big profits

This Acme-Hamilton 48-in. conveyor belt, on a Goodman Rope-belt Conveyor is carrying coal at 1500 tph with low maintenance costs and long service life. Note how nicely the belt troughs under the bulky load—and how flat it runs between the return idlers...sure signs of excellent construction and fine quality.

PYROPRENE PROTECTED against fire, Acme-Hamilton U.S.B.M. accepted belts will not feed or spread fire. The cover is fire-resistant Pyroprene; fabric plies and breaker fabric are encased with Pyroprene compound before the belt is built. Cover has exceptional resistance to abrasion and cutting. Write Acme-Hamilton Dept. CA-91.

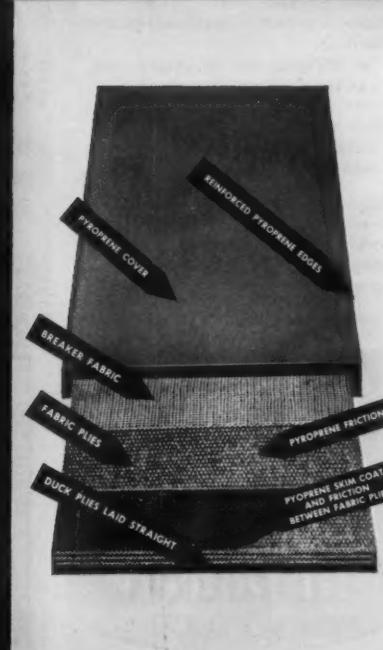
Acme **Hamilton**



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NEW!

SAVE TIME... LABOR...

McDowell
FAST LINE

**Portable Steel Pipe
with Integral Couplings**



- Hand tightening . . . no special tools needed.
- Easy to install . . . leakproof gasket built in.
- For compressed air, water, oil, gas supply lines.
- One man can handle 30 ft. section weighing 40 lb.
- Sizes 2 1/2", 3 1/2" and 4" outside diameter.

McDowell Fast-Line pipe has many other advantages . . . all proved under working conditions. It's re-usable, too. Comparative light weight permits ceiling or wall mounting.

Insert tube end
into coupling.

Twist nut tight
that's all!



Write for full details and literature

McDowell
MANUFACTURING COMPANY

PITTSBURGH 9, PA.

Quality Metal Products Since 1900

News Roundup (Continued)

People in Coal (Continued)
from p 35

Caperton, Slab Fork Coal Co.; vice president, W. W. Walker, Ashland Mining Corp.; and treasurer, Norton Stone, United Pocahontas Coal Co. In addition, the following members of the executive committee were reelected: John J. Foster, Island Creek Coal Co.; W. A. Haslam, Winding Gulf Coals, Inc.; R. B. Williamson, Amigo Smokeless Coal Co.; H. John Harper, Eastern Gas & Fuel Associates; Warren F. Leatherman, Crozer Coal & Land Co.; Leonard J. Timms, New River & Pocahontas Consolidated Coal Co.; Roland C. Luther, Pocahontas Fuel Co.; and Paul Morton, Cannetton Coal Co. A. S. Kemper Jr., Premier Pocahontas Co., was added to the executive committee.

before the end of 1960. This decision is said to be consistent with the parent company's policy of disposing of certain of its assets.

Minerals Development Co., a subsidiary of Heiner Coal Co., Salt Lake City, has acquired Book Cliffs Coal Co., according to R. G. Heers, Fontana, Calif., president of Book Cliffs. The property purchased consists of mine equipment, coal contracts and 320 acres of coal lands adjoining U. S. Steel Corp. holdings in Emery County, plus a one-half interest in 2,400 acres of leased coal lands in Carbon County. Minerals Development also announced purchase of the other one-half interest in his 2,400-acre lease from Malcolm N. McKinnon. The firm estimated combined coal reserves on the lands at about 25 million tons. It is a non-coking, bituminous deposit.

Obituaries

Carel Robinson, an internationally known consulting mining engineer and chairman of the board of Robinson and Robinson, passed away Sept. 20. Mr. Robinson's work included studies by him and his firm of the entire Belgian coal industry as well as French, German and Turkish mines under the auspices of the Marshall Plan and on coal properties in all major coal producing areas of the U. S., Canada and Alaska. He also did some extensive consulting engineering in Russia.

Thomas G. Fear, former general manager of operations with Consolidation Coal Co., died Aug. 13. He had also held various positions with Buck Run Coal Co., the Tennessee Coal, Iron and R. R. Co. and Inland Steel Co.

Mines, Companies

(Continued from p. 48)
business, and it definitely has been determined that Boone County Coal Corp. will discontinue active mining operations

All outside mining operations at Kenilworth have ceased with completion of work joining the Kenilworth and Castle Gate mine tunnels, Carbon County, Utah. All operations now will be from the Castle Gate side. The mine shaft had dropped more than 6,000 ft from the surface and the coal had to be hauled up the main slope by a hoist. Now that the two underground tunnels have been joined, the coal being removed is at the same level as the outside works at Castle Gate. The Independent Coal and Coke Co. started the changeover about 2 yr ago because the Kenilworth side of the operation was becoming too expensive.

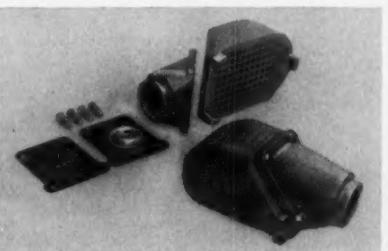
Utilization

Fine particles of solid fuel blown directly into the smelting zone of an experimental blast furnace can replace up to a quarter of the metallurgical coke normally required without sacrificing furnace performance, according to a U. S. Bureau of Mines report. The experimental furnace produced from 16 to

(Continued on p. 54)

CAST ALUMINUM
Guyan®
STRAINERS
ECONOMICAL and
LONG LASTING

Manufactured by **GUYAN MACHINERY CO. LOGAN, W. VA.**



TWO and THREE INCH SIZES
Write for literature

NEW! CARMET® BR and RB Quick-Change Bits

For Faster Changes...For Longer Life

Faster bit changes and fewer of them are yours with the new Carmet cutter bits designed for tool blocks using a Neoprene cylinder to hold bits without setscrews. Special Carmet advantages make cutting easier, tools last longer.

B style has a flat, square back gage stop to prevent tearing the block and wearing the neoprene, and a front removal notch. RB has a front gage stop and back removal notch for applications where it is easier to remove the bit from the back. The RB's two step tip design leads to easier regrinding, and lower grinding costs.

Detail features of these bits are shown at the right, and both are available with open faced, full radius carbide inserts (designated B and RB), or with the round, cylindrical plug insert (designated BR and RBR).

Why these new Carmet Cutter Bits are Better and Last Longer

- ✓ Gage stops are flat — designed to prevent battering and swedging of tool blocks.
- ✓ Gages are a full $\frac{1}{8}$ inch and have smooth edges to eliminate splitting and mushrooming of blocks. This design also insures longer life for the Neoprene cylinder that holds the cutter bit.
- ✓ Three grades of carbide are available in Carmet cutter bits — to give you long life by matching the right carbide grade to your cutting requirements.

Quality Is In Every Carmet Cutter Bit

Carmet makes its own cemented tungsten carbide inserts. Carmet control over all phases of bit manufacture is your guarantee of top quality.

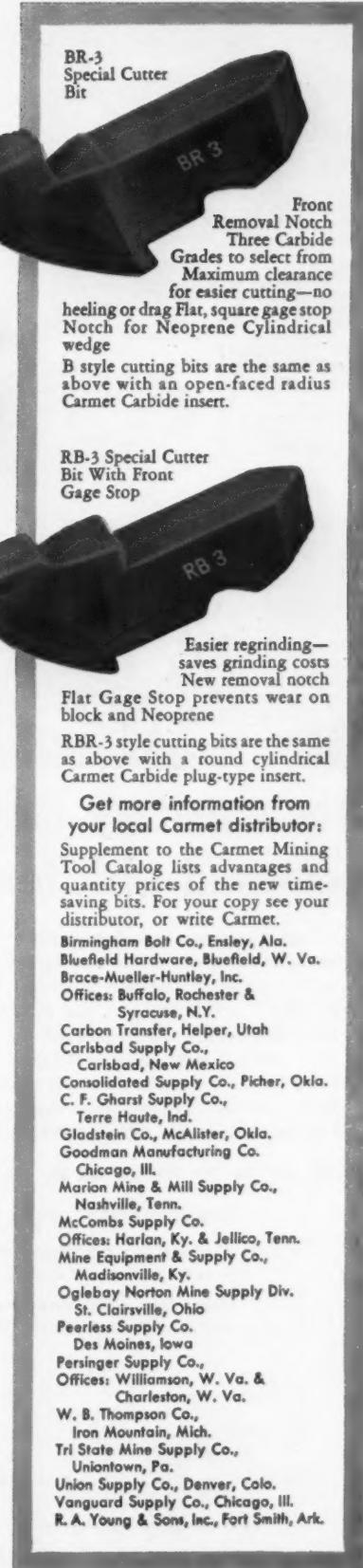
Call on your local Carmet distributor for mining tools with quality built in all the way through. He has complete stocks of the Carmet tools you need and can help you in their selection because he knows local mining conditions. And, your Carmet distributor is always glad to send out the Carmet field engineer to help you solve tool problems and cut mining costs — or even set up an entire tooling program for your particular mining operation.

Insist on the best in tools and local service. For a catalog supplement sheet on the BR and RB quick change bits, call your local Carmet distributor (see list), or write: Allegheny Ludlum Steel Corporation, Carmet Division, Ferndale, Detroit 20, Michigan. Address Dept. CA-11.

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3911





Documentary movie shows how non-stop haulage achieved with fewer men and less equipment

A year was necessary to film, at intervals, the operations you will see in this actual case history of a change-over to S-D Automatic Overlapping Cars. It shows operations BEFORE . . . DURING . . . and AFTER conversion to a main line haulage system that reduced cost to the minimum and provided Non-Stop Maximum Haulage — with fewer men and less equipment. It further features Automatic Loading Stations, what they do and how they operate in this mine. This documentary 22-minute color

and sound 16mm movie is available now for your review. Ask us to mail this film to you for showing to your operating personnel . . . or, ask us to have one of our representatives bring projector and the movie to show for you. Write or call us today. Use coupon below to make mail request.

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KNOXVILLE, TENNESSEE

SANFORD-DAY P. O. Box 1511 KNOXVILLE, TENNESSEE

We have sound projector. Please mail film "Non-Stop Maximum Haulage" to us for review and study.

Please have your representative contact me. We would like to have him visit us to show the movie "Non-Stop Maximum Haulage".

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Now
Ready
for
Mailing...

H&P
WASHING
CYCLONE
PLANTS



HEYL & PATTERSON, Inc.

Pittsburgh, Pennsylvania

Developed in the
Heyl & Patterson
Laboratories—
the result of many
years of thorough
research and testing.

The H & P Washing Cyclone Circuit assures the economical recovery of premium quality fine coal.

The most demanding market requirements as to ash contents of the product can be easily satisfied by controlled changes of the washing gravity.

The H&P Washing Cyclone is Tested—Proven—and Accepted!

If you want to increase the yield of your overall operations by sharing in the growing market for clean fine coal, consult H & P's experienced staff. Discuss a suitable addition to your present preparation facilities or an entirely new plant. Odds are that a searching investigation will lead you to consider the application of H & P Washing Cyclones.

For a start to more profitable operations—request the new Brochure 1160—The H & P Washing Cyclone.

HEYL & PATTERSON, Inc.

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ENSIGN-CLARK
A. C. Magnetic WOUND ROTOR
DUAL DRIVE
MOTOR
STARTERS
for... BELT CONVEYORS



Photograph illustrates an Ensign-Clark Bul. 26100 non-reversing starter for controlling two 125 H.P., 440 volt, 3-phase, 60-cycle A. C. wound rotor motors.

NEMA V enclosure. Resistors in separate compartments on rear not shown in photograph. Controls for operating both motors at once or independent of each other are seen in separate center compartments.

ENSIGN-CLARK
A. C. MAGNETIC STARTERS ARE ALSO
AVAILABLE IN MANUAL REVERSING
AND MAGNETIC REVERSING

OPTIONAL FEATURES:

- NEMA 1 Dust-tite or Bureau of Mines Construction.
- Circuit Breaker Disconnect.
- Belt Slippage Protection when used with Ensign Centrifugal Switch.
- Control Circuit Transformer
- Sequence operation when used with Ensign Centrifugal Switch.
- Motor Disconnect Plug.
- Skid Mounting.

ENSIGN

ELECTRIC AND MANUFACTURING CO.

914 Adams Avenue Huntington 4, W. Va.



News Roundup (Continued)

20 tons of pig iron per 24 hr. Buckwheat anthracite No. 4 was the solid fuel employed but the report states bituminous coal fines or coke "breeze" could also be used—the major requirement being particles small enough to be carried easily in an air stream. Tests were conducted by the Bureau at Bruceton, Pa., under a cooperative agreement with the U. S. Steel Corp.

New energy sources for future electric power needs of customers of Pacific Power & Light Co. are the goal of teams of scientists and geologists working in PP&L's research and engineering departments. In some ways the investigations of northwest coal fields parallel Pacific Power's development of the sub-bituminous coal deposits near Glenrock, Wyo., although lacking the immediate use of the energy source represented by the construction and expansion of the Dave Johnston plant. During the past several years PP&L geologists and mining engineers have investigated sub-bituminous coal fields in foothills of west-central Washington state and in the southwest Oregon ridges. Both of these coal field surveys have a place in the future power supply requirements of the western portion of the Pacific Power system which now is primarily dependent upon hydroelectricity. With development of the power potential of the rivers nearly completed—foreseeably in the 1970s—the region's utilities must look to new sources of power. Coal is the one fossil fuel yet found in the area in commercial quantities. The explorations near Centralia, Wash., have proved up deposits holding 150 million tons of coal suitable for burning under boilers for units duplicating the Dave Johnston plant. Pacific Power's Eden Ridge coal field in southwest Oregon's Coos County is being studied as a possible fuel source for a steam-electric plant that PP&L might build adjacent to a hydroelectric project. In the nuclear field, PP&L is one of 53 utilities working together to research a new prototype nuclear power steam-electric plant.

(Continued on p 58)

**Cutter and
Drill Bits**

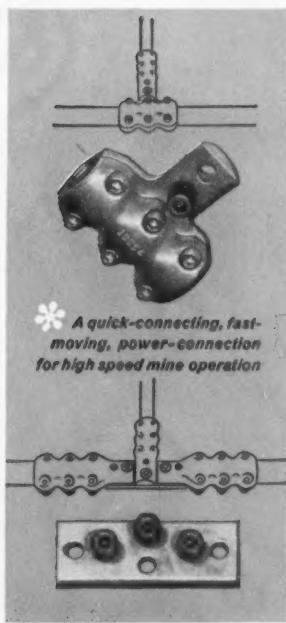
It has been brought to the attention of the editors that Fairview Machine Co., Fairview, W. Va., offers an automatic bit-grinding machine that will dress up to six bits to desired specifications. A note on the availability and functions of this machine should be added to your *Coal Age* Operating Guide entitled "Cutter and Drill Bits." A description of the Fairview bit-grinding machine appears in September, 1957 on p 102.

O-B Designs for Mining Men:



RESULT: you can make connections

**between seven popular sizes of copper or
aluminum cables . . . joining the same or
different sizes . . . either copper or aluminum**



FAST . . . The new O-B Cable Connector makes or breaks a cable connection simply with the turning of two cap screws. These sturdy fittings are especially designed for sections that are picked up and moved frequently.

VERSATILE . . . You can add or remove sections of cable to keep pace with fast machinery. You can make tap-offs, 3-way connections between cables, or a variety of switch and panel arrangements . . . all in minutes!

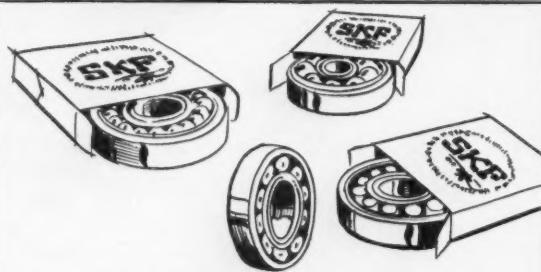
SIMPLE . . . Your O-B Cable Connectors give you the advantages of "built-in" cable connections that hook-up or disconnect simply. No specialist needed . . . saves time and labor on the job.

Write us . . . or see your local O-B sales-engineer to order the new O-B Cable Connectors. You'll find—as others have—that they make moving easier, faster, and considerably cheaper. **OHIO BRASS COMPANY—MANSFIELD, OHIO, Canadian Ohio Brass Company, Ltd., Niagara Falls, Ontario.**

Ohio Brass 
EXPANSION SHELLS AND PLUGS • LINE MATERIALS • SAFETY
AND CONTROL EQUIPMENT • ELECTRIC HAULAGE MATERIALS



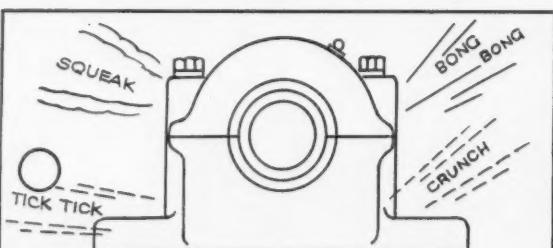
DISTRIBUTOR DAN, the SKF bearing man, shows HOW TO CHECK BEARINGS DURING RUN-IN —to prevent damage and downtime later!



THINK BEFORE YOU INSTALL THEM. The first few hours of operation are the most critical in a bearing's life. So, operate the bearing at reduced speed and load during run-in. Bearing run-in periods vary from a few hours to a few weeks, but 24 hours is usually sufficient.



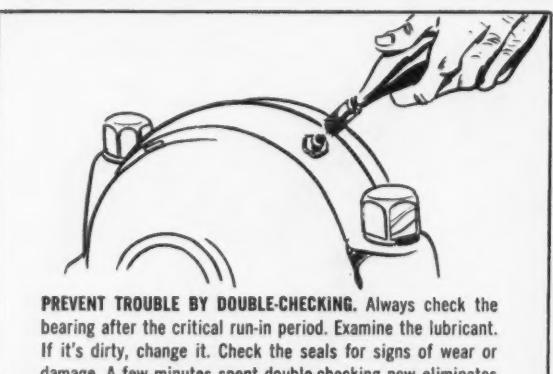
NOISE CAN BE A SYMPTOM. A soft, purring sound is all you should hear from a bearing—if it's operating correctly. Check by placing the blade of a screwdriver and listening at the handle. Any other noise means trouble sooner or later.



KNOW YOUR NOISES. Squeaking means inadequate lubrication. Metallic tones indicate shaft or housing interference or improper adjustment. Smooth, clear tones tell of marks in the stationary raceway. Intermittent noises indicate a damaged ball. Crunching means dirt.



TOO HOT TO HANDLE? There's trouble brewing if the housing feels excessively hot. High temperature usually indicates over-lubrication or use of a lubricant with too high viscosity. It can also be a sign of excessive axial or radial preloading, misalignment, tight-fitting seals, or rubbing.



PREPARE TROUBLE BY DOUBLE-CHECKING. Always check the bearing after the critical run-in period. Examine the lubricant. If it's dirty, change it. Check the seals for signs of wear or damage. A few minutes spent double-checking now eliminates chances of costly damage and downtime later.



Baffled by a bearing problem? Whether it's selection, mounting or maintenance—consult your Authorized SKF Distributor. He's staffed to help you keep them running smoothly and he stocks all the bearing types and sizes you need.

SKF

AUTHORIZED DISTRIBUTOR

6018



Spherical, Cylindrical, Ball, Tapered and REED Miniature Bearings



EVERY TYPE—EVERY USE
SKF

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

REG. U. S. PAT. OFF.

New M-S-A® AIRSLIDE® Rock Dust Distributor increases hopper capacity 25 times

Up to now, hopper capacity for face rock dusting machines has been limited. It has been held to 160 pounds of rock dust by seam height and the need for steeply angled hoppers to keep rock dust flowing.

Now, with the Model SC AIRSLIDE you get hopper capacities from *1000 to 4000 pounds of rock dust . . .* an increase of 25 times.

AIRSLIDE METHOD MAKES IT POSSIBLE

The AIRSLIDE method fluidizes rock dust so that it flows almost like water. A heavy belting, with uniform porosity, located in the bottom of the hopper, introduces low pressure air into the rock dust. This fluidizes the dust and makes the flow uniform and constant, even if the dust is damp. The steeply angled hopper is unnecessary. In fact, the rock dust will even flow down a 6° slope.

DISCHARGE RATE UPPED 6 TIMES

In addition to greater capacity, the discharge rate of the AIRSLIDE has been increased six times, to 600 pounds per minute. Large capacity and high discharge rate permit the volume dusting needed to keep pace with rapid advance work. AIRSLIDE uniformly covers ribs, roof and bottom in one operation, using one man. Cuts your dusting costs . . . noticeably.

For additional information call your MSA Representative. Or write, Mine Safety Appliances Company, Pittsburgh 8, Pa. In Canada: Mine Safety Appliances Company of Canada, Ltd., Toronto 4, Ontario.

*T.M. of Fuller Company





Here's the full-flow line filter that has earned acceptance because of its superior performance! The Schroeder Line Filter does a better cleaning job without starving the pump or blocking the circuit. Installed on the pressure or return line, it provides finer filtering with no danger from dirt clogging which can occur with a filter or strainer mounted in the system's suction line.

Schroeder Line Filters are easily installed and accommodate pressures up to 2500 psi. Replaceable filter elements are available with initial particle selection ratings from 3 to 40 microns. Dirt particles .00019 in size are removed from hydraulic lines.

ADD service life to hydraulic systems . . .

ADD mileage to hydraulic fluids . . .

ADD SCHROEDER LINE FILTERS!



News Roundup (Continued)

Duke Power Co. of North Carolina has purchased more than 300 acres of land in Allisonia for possible use as the site for a steam generating plant which will transmit electricity to North Carolina for use in the Duke system. On the New River in Pulaski County, the land is said to be attractive because of its proximity to the southwest Virginia coal fields. Last year the company's coal bill exceeded \$32 million.

News Briefs

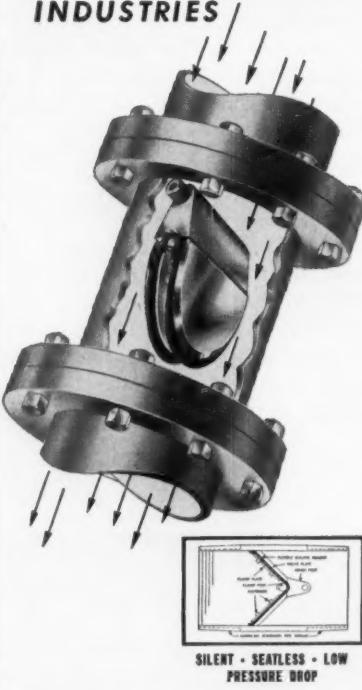
Dominion Steel & Coal Corp., Canada's largest coal producer, soon will import volatile U. S. coal for use in its Sydney works. Not available in Dosco's own collieries, the low volatile coal is needed for blending with Nova Scotia coal to produce good quality blast furnace coke.

Preliminary papers were filed last month which may lead to the acquisition by Glen Alden Corp. of the assets of the Hudson Coal Co., a subsidiary of the Delaware and Hudson Co. The announcement came shortly after notice of abandonment of underground operations at Loree Collieries in Larksville, Pa., which will idle an estimated 300 workers at that mine. The Loree breaker, which will continue to operate, will be utilized by two independent contractors for preparation of the fresh mined coal. The century-old Hudson Coal mines hard coal in the Wyoming and Schuylkill regions between Wilkes-Barre and Carbondale, Pa. Operations of the company have resulted in deficits in almost every year since World War II, according to a D&H spokesman. If the D&H company were to continue to operate Hudson Coal, it would have to finance an expensive capital improvement program which the management wishes to avoid.

After half a century in the heart of Johnstown, Pa., Imperial Coal Corp. on Oct. 3 moved its headquarters to Boltz, Seward, Pa., where administration and engineering will be nearer the center of operations and shops.

Filed recently with the Canadian government, The Rand Report of the Royal Commission on Coal, recommends that no further restrictions be placed on coal imports from the United States to Ontario, Canada. U. S. coal, like Canadian, is attempting to meet competition from Canadian gas and oil, the report states. This important point was raised in testimony from Dr. C. J. Potter, president of Rochester & Pittsburgh Coal Co., Indiana, Pa. Dr. Potter's statement pointed out that competition to Nova Scotian and other Canadian

A BETTER PERFORMING CHECK VALVE FOR THE MINING INDUSTRIES



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OUTPERFORMS •
OUTWEARS OTHER VALVES •
COSTS LESS TO MAINTAIN!

In field service in a wide range of water, gas, air and oil applications, Technocheck's performance and reliability are unsurpassed. Its exclusive design eliminates valve seats. Tight sealing, low pressure drop and long life with low upkeep are some of its important characteristics.

Made in a variety of metals and in Polyvinyl Chloride. Standard and custom models in sizes ranging from 1" to 36".

Write for additional information

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WESTINGHOUSE

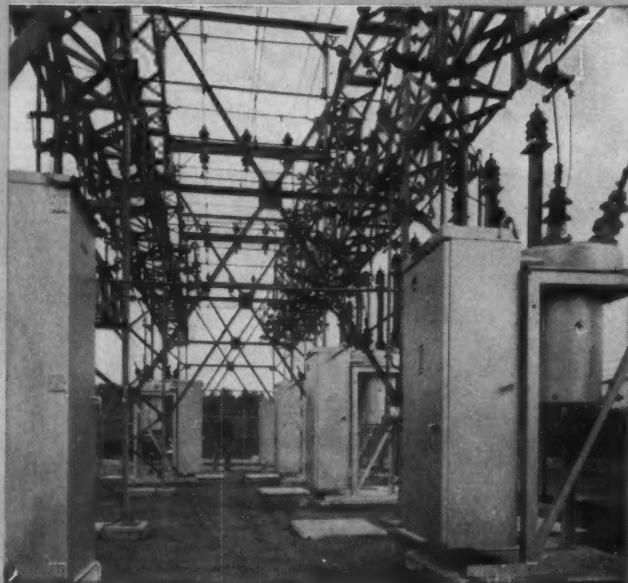
WESTINGHOUSE

WESTINGHOUSE

WESTINGHOUSE

NEW SOUTHERN ELECTRIC GENERATING COMPANY MINE USES A-C POWER DISTRIBUTION SYSTEM

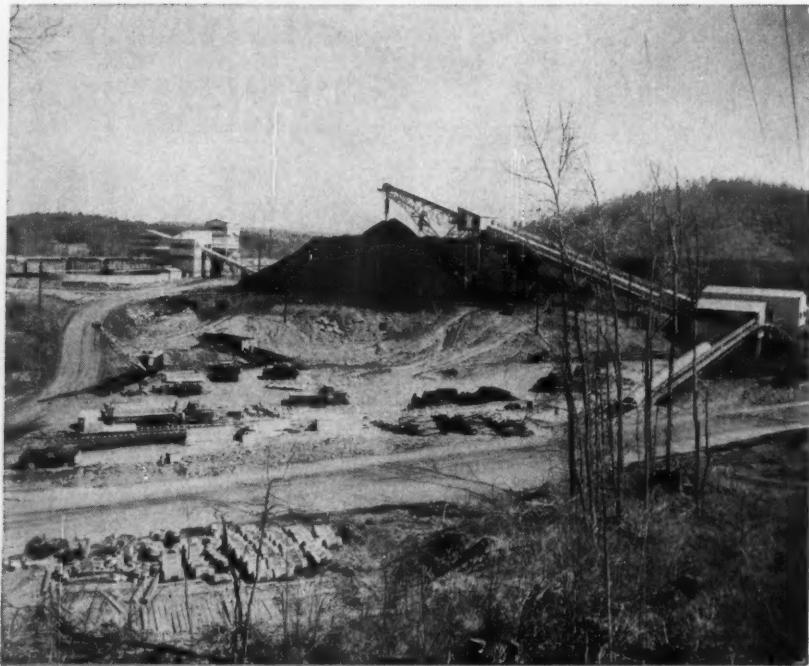
Increased economy, reliability and safety are just three of the many benefits gained from using a-c power in mining operations. At SEGCO Mine No. 1 in Alabama a new Westinghouse distribution system puts a-c power where it's needed at the voltages needed for top machine efficiency. Below, mine engineer inspects mine's main Westinghouse substation.



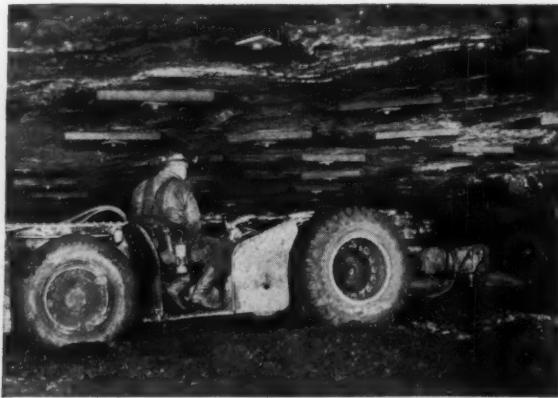
Westinghouse



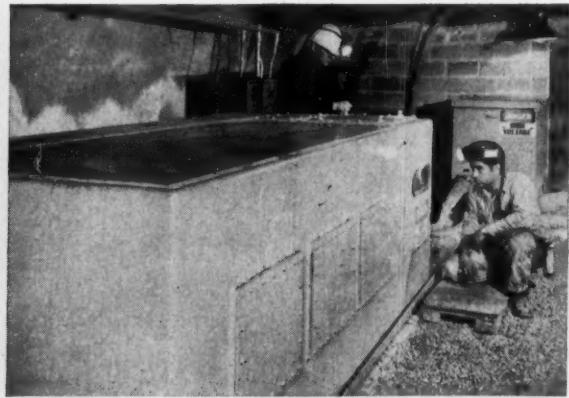
WESTINGHOUSE EQUIPMENT PUTS POWER AT FULL WORKING STRENGTH



Power for production: SEGCO Mine No. 1 is pioneering the use of a-c power in Alabama mining. A-c power, distributed by a Westinghouse system, has helped improve mining operations. All coal produced at the mine is shipped on special railroad cars to SEGCO's new steam generating plant at Wilsonville, Alabama.



On-the-spot-power underground at Mine No. 1 is provided by enclosed, portable Westinghouse power center transformers which carry high-voltage current very near the active face of the mine. Voltage losses



are low, machine operation more efficient. At left, electric undercutting machine in action. At right, mine chief electrician and C. J. Dornbusch, Westinghouse Sales Engineer, inspect power center. Safety disconnect switch is in background.

DIRECTLY AT THE WORKING FACE IN ALABAMA MINE

In the new Southern Electric Generating Company (SEGCO), Mine No. 1, at Parrish, Alabama, underground equipment steadily bites through the coal seams at top efficiency. Reason: the mine is the first large Alabama mine to use a-c power which permits high voltages to be carried right to underground work areas with minimum power loss. The mine receives uninterrupted power through a carefully planned and coordinated Westinghouse distribution system.

STANDARD WESTINGHOUSE EQUIPMENT makes up the mine's power system. A main 3750-kva substation reduces incoming 44,000-volt power to 12,400 volts. Auxiliary substations step power down to proper voltages for the ventilating fan, pumping station, conveyor system power center, maintenance shop and bathhouse.

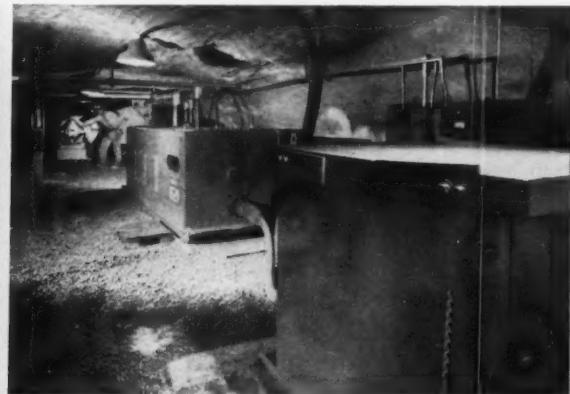
One Westinghouse 500-kva and two 1000-kva surface substations supply 4160-volt power to underground facilities. This power is stepped down to 440 volts by underground power center transformers. Because these small, lightweight, portable centers are easily moved, they can be kept near the machines they serve to deliver power over short distances at full working voltage. Other Westinghouse underground equipment: portable load break disconnects and switchhouses for maximum protection of miners and equipment.

The a-c power supply equipment, because it is simple, rugged and has few moving parts, requires less maintenance and supervision than complex d-c apparatus. Generally costs less, too. (cont.)

Westinghouse



Power for mine trolley is supplied by this 150-kw Westinghouse silicon rectifier which converts a-c to d-c. Track haulage system transports men and materials through main haulage entries. Rectifier requires little space, needs minimum maintenance and offers highest continuity of service and reliability.



Power for conveyor is supplied by a 500-kva Westinghouse underground power center protected by a 5-kv safety disconnect switch (foreground). At rear, mine chief engineer inspects a 225-hp Westinghouse Life-Line® "H" motor which drives crusher conveyor.

WESTINGHOUSE EQUIPMENT PUTS POWER IN ALABAMA MINE... (cont.)

This mine commenced production in August, 1959, now has five of nine projected sections producing about 5000 tons of coal daily. In reserve: necessary Westinghouse equipment to meet future power demands.

THIS RELIABLE POWER SYSTEM is the foundation for boosting coal production. To help mine operators attain this goal, Westinghouse has inaugurated a new concept called *Progressive Automation*. It is a long-term, step-by-step plan leading to economical automatic production. Your nearby Westinghouse representative is ready now to help you formulate your individual *Progressive Automation* plan. Contact him today . . . or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. You can be sure . . . if it's Westinghouse.

J-96154-4

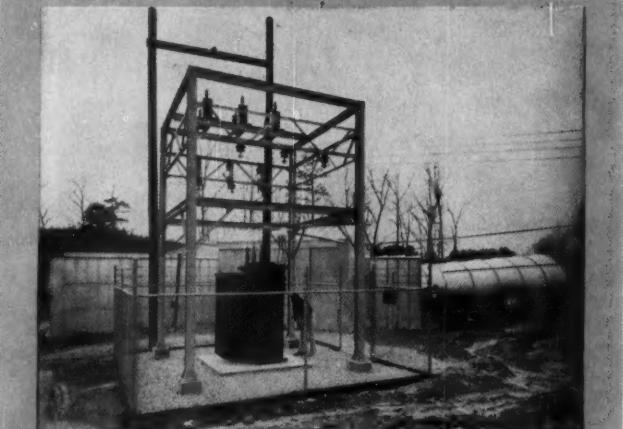


Westinghouse



Power for mining sections is provided by three Westinghouse substations which send 4160-volt a-c current through cables to underground transformers. The Westinghouse distribution system is designed for maximum flexibility so that power can be delivered over shortest possible distance as operations expand. Above, mine engineer checks nameplate at one substation.

Power for ventilation fans is supplied by this 500-kva Westinghouse substation. Substation has the remarkable new Westinghouse-developed Insuldur® insulation system which withstands higher operating temperatures with no additional loss of insulation life.



Announcing an Addition

TO THE



RAYMOND FLASH DRYER FAMILY FOR FINE COAL DRYING A SUPER UNIT:

CAPACITY — 175 TONS PER HOUR

MOISTURE EVAPORATION
38,000 POUNDS OF WATER PER HOUR

Maintaining the principles of Flash Drying as proved in twenty years of service — and now combined in a single, very high, capacity unit.

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PRINCIPAL CITIES

Combustion Engineering-Superheater Ltd., Montreal, Canada

News Roundup (Continued)

coal came not so much from U. S. coal imports as from Canadian gas and oil. Besides establishing maximum subsidies on Canadian coal, the report sets up two kinds of subsidy: (1) basic subsidy to help mines maintain at least skeleton operation and conserve present mining investment values to some extent; and (2) social subsidy aimed at improving coal's competitive position in its own market.

Preparation Facilities

E. L. Jones Coal Co., South Fork, Pa.—Contract closed with Irvin-McKelvy Co., for sizing and preparation plant of 100 tph capacity, storage bins for domestic coal and new railroad loading facility.

North American Coal Corp., Conemaugh Div., Seward, Pa.—Contract closed for 400 tph coal handling system to 3,500-ton storage bins (Neff & Fry) and remote control blending, with Irvin-McKelvy Co.

Imperial Smokeless Coal Co., Mine No. 2, Lee, W. Va.—Contract closed with Deister Concentrator Co., Inc., for 13 Concenco "77" twin-deck Diagonal Deck

Bituminous Output

YEAR TO DATE	PRODUCTION
Oct. 15, 1960	326,493,000
Oct. 17, 1959	319,442,000
1960 output	2.2% ahead of 1959.
WEEK ENDING	PRODUCTION
Oct. 15, 1960	8,510,000
Oct. 17, 1959	7,970,000

Anthracite Output

YEAR TO DATE	PRODUCTION
Oct. 15, 1960	13,895,000
Oct. 17, 1959	15,974,000
1960 output	13.0% behind 1959.
WEEK ENDING	PRODUCTION
Oct. 15, 1960	394,000
Oct. 17, 1959	386,000

coal washing tables to handle $\frac{1}{4}$ x0 coal, and two Concenco Type CCF feed distributors.

Johnstown Coal and Coke Co., Crichton No. 4 plant, Nettie, W. Va.—Contract closed with Kanawha Mfg. Co., for heavy media washing plant for 8x $\frac{1}{2}$ coal, ca-

pacity 200 tph. Equipment includes Wemco 12x12 drum, ORC 2-cell washer, 40-ft static thickener and vacuum filler for completely closed circuit.

Rich Hill Coal Co., Cresson, Pa.—Contract closed with Ridge Equipment Co. for Ridge Airjig to handle 75 tph of $\frac{3}{4}$ x0 coal at the Hastings Mine.

Sandy Creek Fuel Corp., Kingwood, W. Va.—Contract closed with Ridge Equipment Co. for 55 tph Ridge plant including Airjig, rotary breaker and feeder installation.

New Shamut Mining Co., St. Marys, Pa.—Installation completed by Ridge Equipment Co. of 75 tph Ridge Airjig plant including Ridge C-6 dust collecting system. Plant processing minus $\frac{3}{4}$ coal.

Hyasota Fuel Co., Jerome, Pa.—Installation completed by Ridge Equipment Co. at Thacker mine for Ridge Airjig used in cleaning 55 tph of high ash refuse material.

Equipment Approvals

Mine Safety Appliances Co.—Air-slide rock dust distributor; one motor, 10 hp, 550-V, DC. Approval 2F-1496A, Sept. 7. [Approval 2F-1496 covering 250-V, DC design of rock dust distributor was issued to Mine Safety Appliances Aug. 31, 1959.]

Long-Airdox Co.—Type LRB-4 roof-bolting machine; two motors, one 10-hp and one 5-hp, 220-440-V, AC. Approvals 2F-1578 and 2F-1578A, Sept. 7.

Long-Airdox Co.—Type D-4199 Battery-powered utility truck; one motor, 5 hp, 96-V, DC. Approval 2F-1579, Sept. 12.

Joy Mfg. Co.—Type 10SC9PHY/PHH/PXHH-I shuttle car; three motors, each 25 hp, 380-415-V, AC. Approval 2F-1580A, Sept. 22.

Jeffrey Mfg. Co.—Type 78-C Molveyor (self-propelled chain conveyor); 27 motors, 15 5-hp and 12 1-hp, 250-V, DC. Approval 2F-1581, Sept. 22.

National Mine Service Co.—Diesel-powered 3-ton mine locomotive with Deutz Model F3L/712 air-cooled diesel engine for use in noncoal mines. Approval 24-32, Sept. 22.

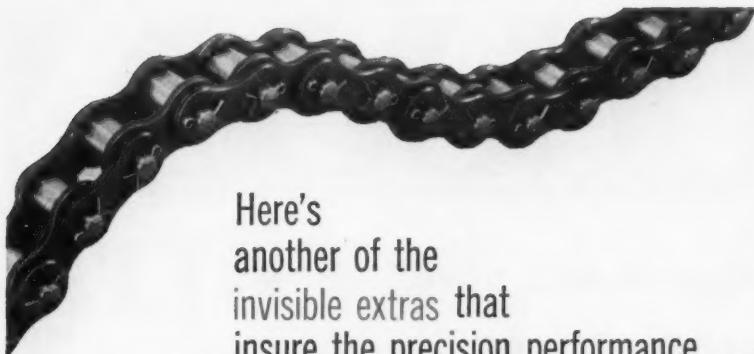
Joy Mfg. Co.—Type CD61 coal drill; one motor, 26 hp, 250-V, DC. Approval 2F-1582, Sept. 27.



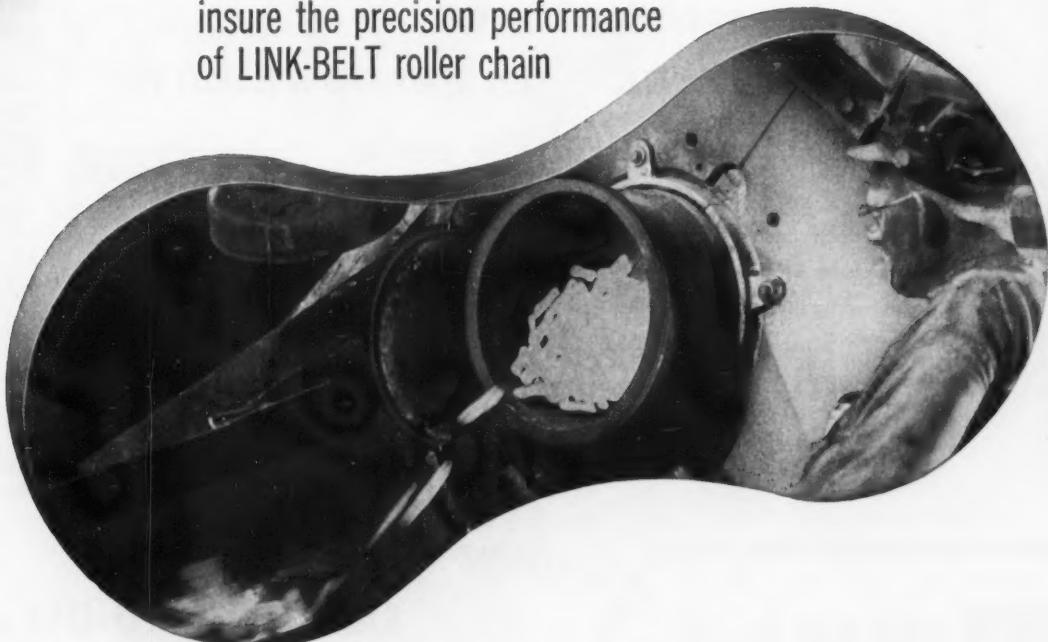
Navco "Long-Stroke" Air Vibrators dislodge arched material with a timed piston impact... do not "pack" materials with high frequency vibration. Exclusive patented "one-piece" design eliminates body assembly bolts, cuts vibrator maintenance up to 80%. Easy to install, units will operate in hazardous atmospheres, inclement weather or magnetic dusts.

For application catalog, write Dept. CA-11.

NATIONAL AIR VIBRATOR CO.
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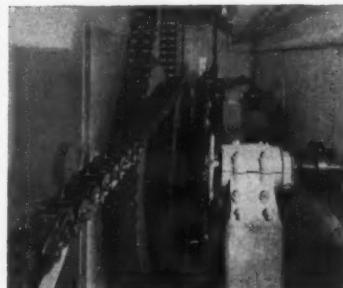
Here's
another of the
invisible extras that
insure the precision performance
of LINK-BELT roller chain



Painstaking precision of heat-treat control gives you
uniform strength in every link

To produce roller chain of utmost uniformity, Link-Belt maintains exacting control of all heat-treating processes. With equipment and instrumentation exactly tailored to the need, all processes are carefully adjusted to suit the characteristics of each heat and analysis of steel. Result: roller chain of uniform strength *well above accepted standards*. Chain that absorbs shock loads, delivers full power under continuous heavy going.

Precise heat-treat control is one of many *invisible extras* that contribute to the greater strength and endurance



Single and double strand Link-Belt roller chains combine to provide dependable, positive power transmission at this installation.

of Link-Belt roller chain. Others include prestressing, pitch-hole preparation, shot-peening. These features—plus painstaking precision and inspection in every step of manufacture—assure you of chain that can easily cope with today's heavy loads and high speeds.

For engineering assistance in applying industry's preferred roller chain, contact your nearest Link-Belt office or authorized stock-carrying distributor. Ask for Book 2657.



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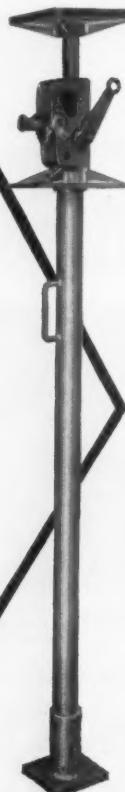
More than fifty years of "firsts" in automatic weighing



**NEW easy way to
recover roof bolts with
SIMPLEX**

**TRIP POST
JACK No. M279**

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- Light weight — 72" min. height, weighs only 36 lbs.
- Sizes for all seam heights available



SAFE, EASY-TO-USE...

**Two men can recover
350 bolts per day by
using it as follows . . .**

Place a Jack alongside each of the first row of bolts closest to the face. Raise to the roof to provide temporary support. Remove bolts by hand or pneumatic wrench. Stand 25' or more away and pull on a rope attached to the Jack trip lever which collapses the Jack. Move Jack to position under the next row of bolts and proceed as previously.

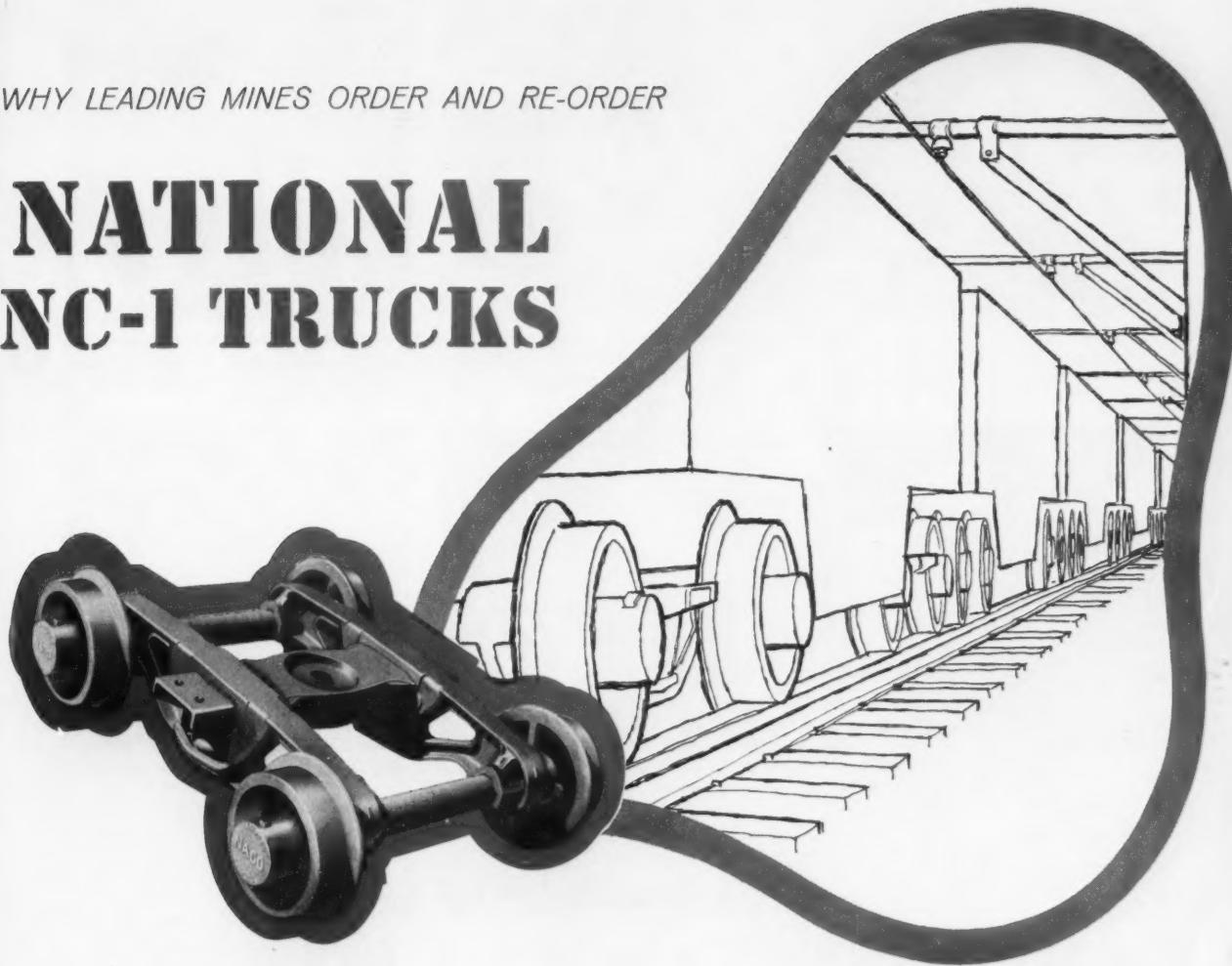
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The reasons for the decided swing to National NC-1 Trucks are fundamentally two: they provide safety to personnel and equipment...they make money for mine operators. There are lots of technical reasons, too. Let our representatives tell you all about them.

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COMPANY

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AN EARLY START enables Bob Shiel, Hercules technical serviceman, to observe step-by-step blasting procedures at his customer's mine.



CLOSE CONTACT between Bob and the mine superintendent eliminates most blasting troubles, and increases the operating economy of the mine.



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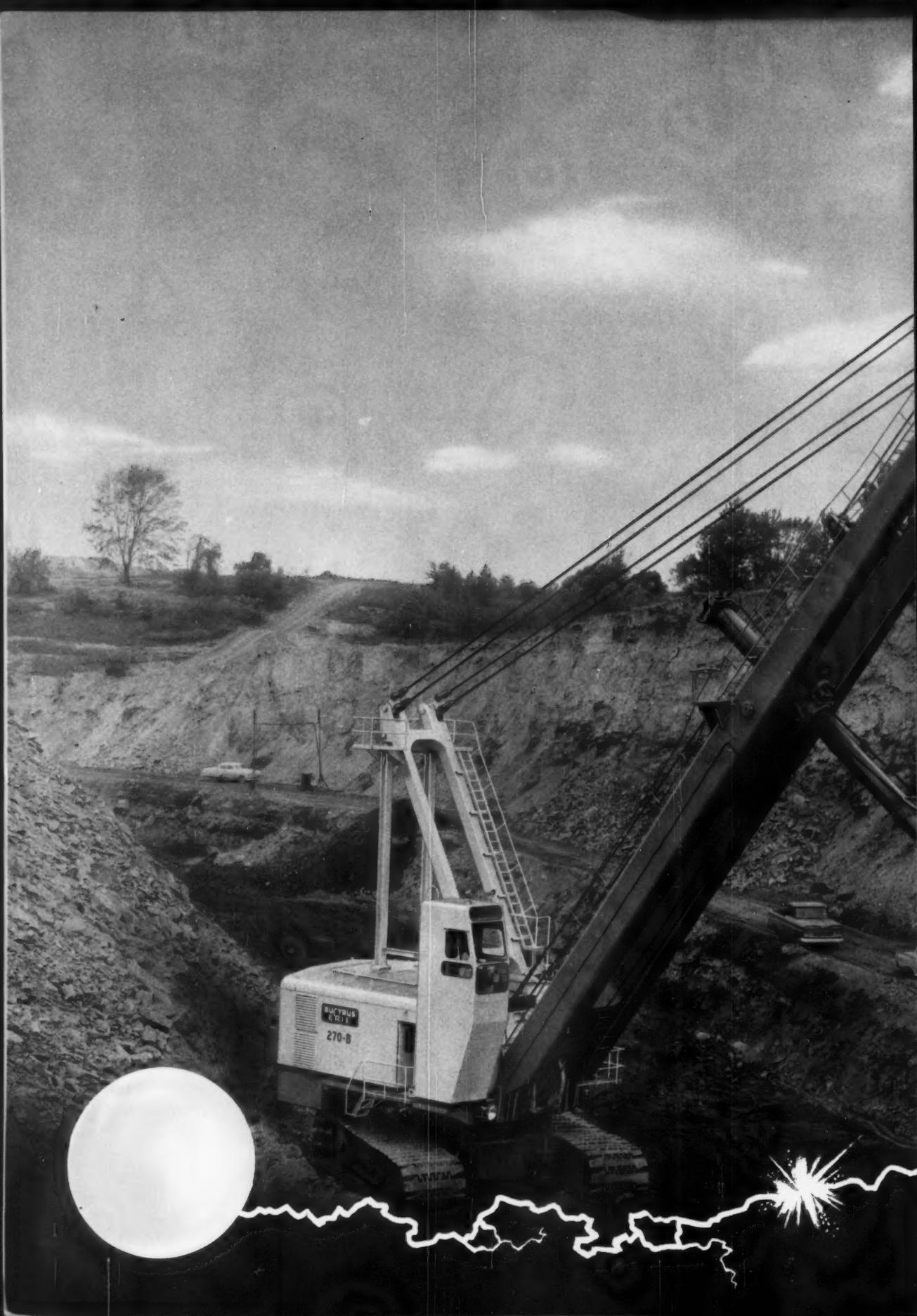
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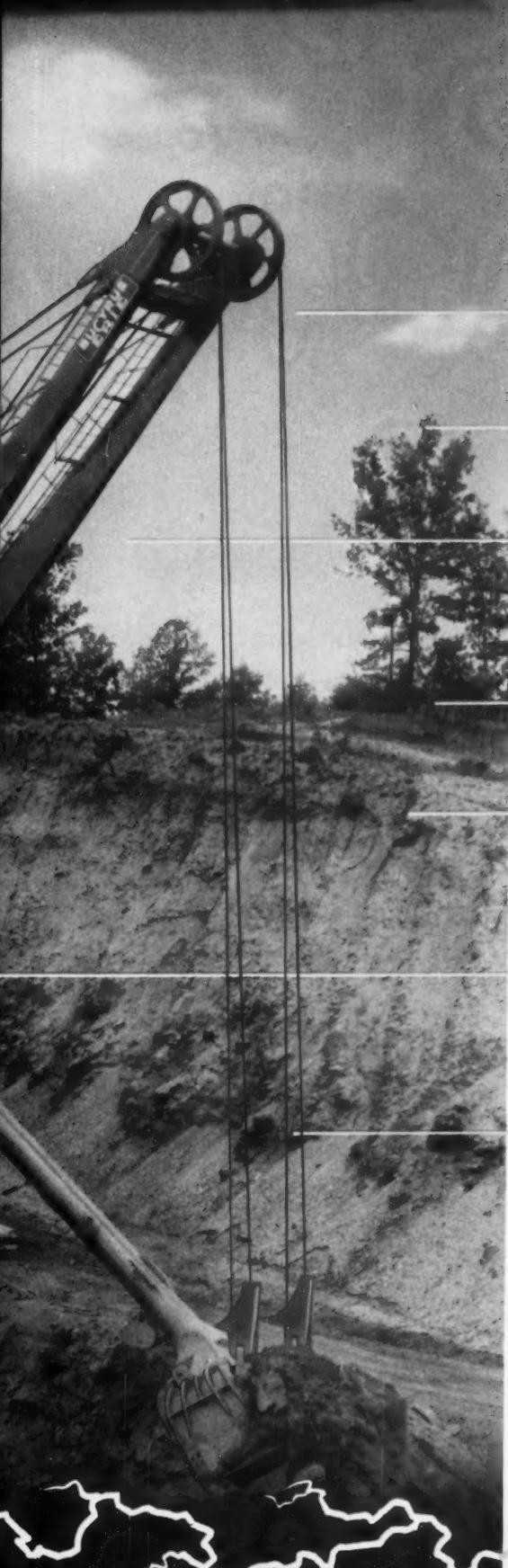
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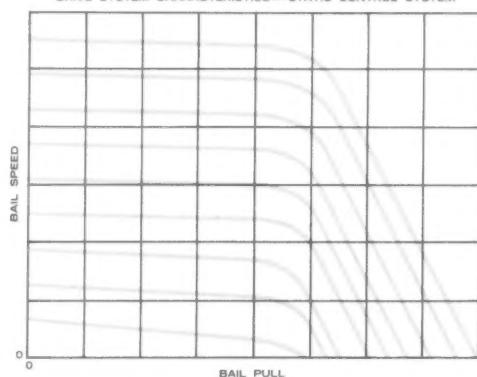
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NOVEMBER, 1960

IVAN A. GIVEN, EDITOR

BIGGEST NEED STILL

LIMITED FUNDS has been the biggest handicap in coal research, whether by the industry or by outside agencies. Funds are not too plentiful even yet, though the Congress has voted some help. At the same time, however, industry support was curtailed, in part because of reduced tonnage and thus reduced income.

But money aside recent developments make re-examination of ideas and programs a must—this in spite of the wide discussion and earnest consideration given to research and what it should accomplish in the past. The government is in the picture and the bituminous industry is moving to improve its facilities. This makes it a logical time for a new look. How much money and time, for example, should be devoted to production and preparation research? The labor content of a ton of bituminous still is about twice what it should be. What would bring it down fastest and farthest? How much should be

devoted to cutting the cost of mine-to-market movement—now a fairly close second to mine price as the biggest element in the cost to the consumer? Is the dry pipeline, for example, worth a major effort? How much should be devoted to expanding present markets and opening up new ones? Synthetic oil and gas would mean hundreds of millions of tons of business. Is there enough chance of achieving competitive progress to warrant a real research campaign?

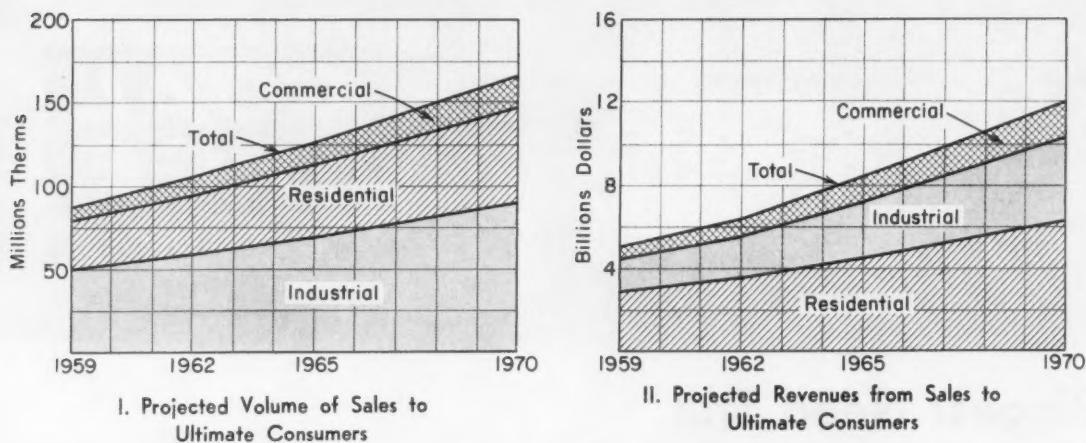
These and many other questions are involved in getting the most out of research dollars—especially when they are not too numerous. Perhaps no man or group of men can agree on a "ten best" list of projects, but concentrated effort can materially increase the chances of success. And if more money could be devoted to this vital activity the industry benefits would be materially enhanced. Money in adequate amounts still is the biggest need in coal research.

NO FIREWORKS

IF THERE SHOULD BE a question as to whether the United Mine Workers would go back to the militant tactics of the past, the conduct of the officers and delegates at the 1960 quadrennial constitutional convention may perhaps be accepted as indicating the probable answer. True, some delegates and at times some officials were disposed to take a fall out of the operators—often apparently for the record—and true also some firebrain could get control in the future, in which case things might get back to the popping era.

Observing the convention in its deliberations left the definite impression that the union appreciates its responsibilities for the advancement of the industry's cause, including continuation of such activities as actually selling coal. So co-operation will be the watchword unless something radically unexpected should come up, though as always the union will expect what it considers to be its fair share of progress. But in turn the operators should be able to rely on an increased willingness to render full value in return.

How the Gas Industry Sees Its Future, 1959-70 . . .



Outlook: Coal vs Natural Gas

In spite of ominous probabilities for the immediate future, a fact-and-opinion roundup shows long-range gas industry planning carries less of foreboding and more of promise for coal. Gasification still offers big tonnage outlet for 70s.

W. A. Raleigh Jr.
Associate Editor, *Coal Age*

WHAT'S AHEAD for coal in its competitive battle with natural gas? In last month's lead feature, "Outlook: Coal vs Oil," petroleum economists cued the probable answer for the immediate future, in substance, as follows:

- Coal is much too worried about imports of residual. The real villain is not oil but natural gas which is poised for a major invasion of northeastern industrial markets.

- Even if coal succeeds in cutting down imports of residual oil, or knocking them out completely, natural gas will probably fill the vacuum of needs as long as the Federal Power Commission controls wellhead prices, permits interruptible gas sales and approves Canadian imports.

Adding further grist to the mill, FPC's new area-pricing controls

adopted September 28, have at least temporarily burst bubbles of hope that gas was getting ready to price itself out of industrial markets where it competes with coal. Essentially, the new controls aim at stabilizing prices rather than at lifting ceilings to make price increases possible (see panel p 76.)

In spite of such ominous probabilities for the immediate future, a *Coal Age* fact-and-opinion roundup shows long-range gas industry thinking and planning carries less of foreboding and more of promise for coal.

Gas industry planning, for example, continues to allow for losses in the industrial market. The American Gas Association estimates that industrial sales volume in 1970 will account for 53.6% of the total, compared to 56.8% in 1959 and 61.5% in 1948.

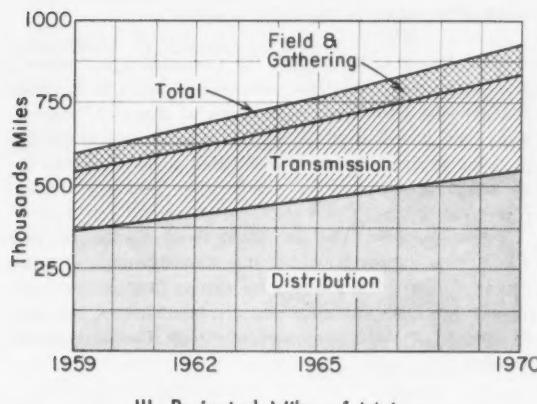
Informed observers, furthermore, cite the mad scramble to build up storage capacity as the "dead give-

away" to gas industry thinking about the industrial market. The scramble is on because most companies would prefer selling to residential and commercial markets where profits are much more attractive. At the same time, the same companies must anticipate higher wellhead prices which will make it increasingly difficult to sell interruptible gas in coal-marketing areas at minimum profits.

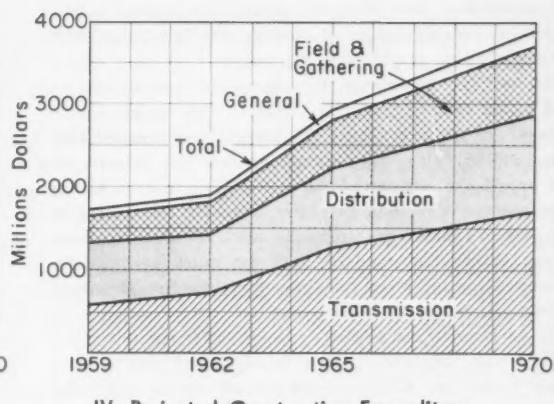
Although growth will focus on increasing residential and commercial sales volume, there is a strong built-in tendency to underrate competition in these areas. In the residential market, for example, as the drive for the all-gas home gathers momentum, the gas industry apparently gives little or no ground to potentials for the all-electric home—already a growing success and holding a big stake for coal (*Coal Age*, January, 1959, p 70).

Similarly, in all three marketing categories—residential, commercial and industrial—fantastic increases projected for growth in air-conditioning are probably blown up unrealistically in view of the fact that electric power now rules the roost here and is aggressively pursuing deeper and wider footholds.

Analysis of gas industry planning also shows that the tightening profits-



III. Projected Miles of Main



IV. Projected Construction Expenditures

squeeze at the production level, for years a natural concern of producers, is more and more taking shape as a common industry problem. If producers do not have incentives to explore for and develop new supplies, what, pipeline companies and distributors are asking, will we have to sell?

At AIME's annual meeting last February, W. B. Golush, Shell Oil Co., suggested this answer to the producer price-relief problem: "The average wellhead price in 1958 of 11.9c per MCF on all gas must rise to 18 to 20c within 3 yr and to 25c within 10 yr to sustain intensified exploration activities."

On balance, coal can look for these plus- and minus-trends in its competitive tug-of-war with natural gas:

1. Competition will get tougher in the industrial boiler-fuel market before it eases off, as it probably will between 1963-65. Pressures for producer-price relief should go critical then and accelerate the trend for gas to price itself out of the market.

2. Gas will continue to increase its share of residential and commercial markets. But electric utilities, backed by coal and other allied industries, can do much to stem the tide of advance, or perhaps even reverse it, through all-out merchandising of all-electric service.

3. Sometime during the seventies, an alliance between coal and gas to produce coal-based high-Btu pipeline gas is still much in the offing. The gas industry's own research organization, the Institute of Gas Technology, is planning on this eventuality as vital to supplementing domestic supplies and imports of the natural product which, it is convinced, will not be enough to sustain expected growth in gas demand.

Gas Industry Planning: Operational Goals, '59-'70

The charts on this page show growth in gas industry operations during the period, 1959-70, as projected by the American Gas Association in August, 1960. Projected growth is defined more precisely in the following tables based on AGA data:

I. Projected Volume of Sales To Ultimate Consumers

	Millions of Therms					% Up '59 '62 '65 '70 '59-'70
	Residential	Comm'l.	Ind'l. &	Other	TOTAL	
Residential..	30	36	44	57	95	
Comm'l.....	8	11	13	19	137	
Ind'l. &						
Other.....	50	58	69	89	78	
TOTAL.....	88	105	126	165	88	

II. Projected Revenues from Sales To Ultimate Consumers

Billions of Dollars

	% Up '59 '62 '65 '70 '59-'70				
Residential..	2.9	3.6	4.5	6.2	114
Comm'l.....	0.6	0.8	1.1	1.8	200
Ind'l. &					
Other.....	1.6	2.0	2.7	4.1	156
TOTAL.....	5.0	6.5	8.3	12.0	120

III. Projected Miles of Main

Thousands of Miles

	% Up '59 '62 '65 '70 '59-'70				
Distribution	372	415	462	546	47
Transmission	174	201	230	286	64
Field & ga- thering....	54	64	73	92	70
TOTAL.....	600	680	765	924	54

IV. Projected Construction Expenditures

Millions of Dollars

	% Up '59 '62 '65 '70 '59-'70				
Distribution	643	726	956	1,163	81
Transmission	694	740	1,261	1,711	147
Prod. & storage....	306	371	603	842	175
General.....	85	79	128	170	100
TOTAL.....	1,728	1,916	2,948	3,886	125

In the foregoing projections, AGA states, past trends have been adjusted "to reflect likely changes in the eco-

FPC's New Area Pricing Upsets '61 Gas Bill Plans

THE FEDERAL POWER COMMISSION'S action (Sept. 28) establishing area prices for natural gas production has upset gas industry plans of seeking new legislation. The industry is now at odds over this issue.

Before FPC's September pronouncement, industry leaders had hoped to have ready for Congress' 1961 session a new natural gas bill prescribing FPC's regulatory bounds. But, after a 6 yr delay, the Commission beat the industry to the punch and announced the area-pricing system. Under this concept, FPC sets gas rates which it will accept in the Nation's major gas producing areas. Producers asking prices within the standards will get quick certification; those seeking to exceed the announced levels must make a strong case before the commission.

In deciding to use pricing by areas, FPC renounced the utility-type regulatory approach of determining a producer's costs and adding a fixed rate of return—traditional pipeline regulation. This came as a relief to gas producers, although the area system left them with two major doubts:

1. The more militant wing of gas producers still would prefer complete decontrol and wants Congress to enact legislation barring FPC jurisdiction over gas sales at the wellhead. This would have the effect of upsetting the U.S. Supreme Court's 1954 Phillips Case decision asserting FPC jurisdiction; realists among gas producers have long ago given up hope for such de-control.

2. There is a fear among some producers that area prices will constitute a "freeze," making increases above a given level difficult to get.

FPC set an 18c per MCF maximum for most gas production prices, with the exception of West Virginia which is close to consumer markets and has higher prices, and with a level for the high priced southern Louisiana area still to be chosen. But the 18c maximum applies to the Texas Gulf Coast, for example, where recent sales have been at 20c per MCF and above.

FPC said its aim is one of stabilizing gas prices, which, at the present, the Commission finds generally "too low" because of cheap gas under long-term contractual commitment. But industry observers expect that, should the FPC action successfully resist court challenge, there will be a short-run increase in gas prices but a long-run curb to the prospect of 25c and 30c per MCF gas in the field.

nomic characteristics of the gas industry." Among adjustment factors, a *Coal Age* analysis sees these key built-in assumptions:

1. Expansion in the Nation's demand for energy will support major increases in the volume of sales to all major marketing categories during the 1959-70 period.

2. Greater sales volume will be achieved primarily by adding new customers at an average annual rate of 1,100,000 during the next 10 yr,

compared to an average annual count of 900,000 during the past decade.

3. Primarily because demand saturation among existing customers (32,500,000) has climbed to relatively high levels, the rate of growth in sales volume in 1959-70, compared to 1948-59, will slow down—from 241 to 95% in the residential market, from 186 to 136% in the commercial market, and from 270 to 78% in the industrial market.

4. Higher delivered prices are an-

ticipated in gas sales to residential, commercial and industrial consumers. Such price boosts, accompanied by a faster rate of new customer additions, will more than offset losses in revenue growth which would otherwise occur because of high demand saturation among existing customers.

5. Price boosts will be a major factor in generating investment capital for construction of new producing and marketing facilities. For such purposes, nearly \$30 billion will be needed during the next 10 yr, with an

As the dust settled on FPC's area pricing announcement, these appeared to be the major reactions:

1. Producers at least think the Commission has taken a step in the right direction. Some groups, such as the large Independent Petroleum Association of America, immediately said it will continue to pump for a natural gas bill in Congress, but that was considered a normal trade association move.

2. Gas pipelines are not particularly displeased with FPC's new approach, which has the advantage of being the least disruptive formula for setting field prices. Local distributors had wanted producers regulated on the basis of costs, but think they can live with the area-pricing system.

3. State regulatory bodies may be the hardest to convince of the efficacy of FPC's action.

An appeal to the courts on the area-pricing plan is almost a certainty. Phillips Petroleum Co., a distributor, or a state utility commission may be the appellant.

But one major upshot of the action is that, regardless of the fuzzy court picture, FPC apparently will set prices on the basis of areas until it is directed not to do so. Many gas industry leaders believe this will have the effect of damaging any chances for passage of legislation by Congress. One of the biggest pitches to be given Congress would have been FPC's inability to arrive at a formula of regulation 6 yr after the Supreme Court gave the Commission that charge. Now, Congress is expected to react somewhat mildly to industry pleas; the logical answer is to wait and see how the area pricing system works and whether the courts uphold it.

The gas industry's ability to continue its competitive fight with coal will be enhanced in some respects, perhaps retarded in others by the area-pricing declaration and the likelihood of no legislation. Some cheap gas presently under contract will rise in price once the contractual obligations are ended; but the prospect of increased coal competition because gas was getting set to "price itself out of the market" will have lost at least temporary momentum if area pricing works as FPC hopes.—McGraw-Hill Washington News Bureau.

nual outlays moving up 125% from \$1.7 billion in 1959 to \$3.9 billion in 1970.

Immediate Problems: Finance, Competition

Industry analysts outside AGA generally agree with the association's estimates of growth potentials for gas consumption. At the same time, they point to critical competitive, and finance problems which could undermine predictions.

Competition — In the residential market, for example, substantial allowances have been made for increasingly higher levels of customer saturation — for the fact, in other words, that gas by 1970 is expected to serve 84% of the total number of househeating customers, compared to 63% in 1958 and 36% in 1949. But, as the price of residential gas goes up, apparently little or no allowance has been made for stiffer competition from oil and electric heating. Either or both of these energy sources could, it is contended, cut serious inroads into projected additions of new residential gas customers.

Furthermore, with electric power now kingpin in air-conditioning and aggressively pursuing deeper penetration of the market, observers outside AGA also wonder if potentials for growth of gas air-conditioning should not be watered down. These potentials, incorporated as a major factor in projecting future sales volume, are defined, in part, as follows:

	No. of Customers	
	1958	1970
Residential.....	25,000	2,745,000
Commercial.....	11,200	232,000
Industrial.....	850	18,000

Another frequently cited problem is the prospect of continued upward movement in gas prices and the impact this factor will have on the industrial market and total industry growth.

Defining the problem at Congressional hearings on "Energy Resources and Technology" in October, 1959, FPC Commissioner Arthur Kline stated:

"The factor most likely to retard future growth of the natural gas market will be the inability of gas to com-

pete in price with coal and fuel oil, its chief competitors. Until recently, gas has enjoyed a distinct price advantage, but in the last few years this advantage has diminished and even disappeared in certain areas insofar as industrial markets are concerned.

"Fuel oil and coal are still unable in most areas to compete with gas for domestic and commercial uses, but since the industrial load comprises more than one-half of the total gas consumption, any substantial loss in this area will seriously affect the growth of the natural gas industry . . ."

Crux of the problem, of course, is gas sales for electric power generation—the largest single industrial market which accounted for about 30% of total industrial sales in 1959. Evidence is growing that the gas industry itself would like to get out from under much of this load. Consider, for example, such typical comments made to *Coal Age* as the following:

- The trend is for natural gas to price itself out of electric utility markets where it competes with coal. Present interruptible sales to such outlets generally involve only a small profit above the commodity charge or cost of service. Most companies would much prefer to put off-season supplies into storage for peak-load sales to residential and commercial markets where profits are considerably more attractive. There is in fact now a mad scramble to build up storage capacity for this purpose, in anticipation of higher wellhead prices which will make it increasingly difficult to sell interruptible gas in coal marketing areas at minimum profit."

- The "dead give-away" to gas industry thinking about the industrial market is in its accelerated effort to develop storage capacity. Forecasts show that \$466 million will be spent for this purpose in the 1960-63 period or about 73% more than was invested in 1956-59.

- Now that coal has gained a fair measure of control over the residual oil import problem, we look for a more aggressive campaign to obtain restrictive regulations on interruptible gas sales via the national fuels policy program. Coal people, however, should point their competitive attack on more vigorous support of

efforts aiming at amended controls of wellhead prices. If these controls are modified or lifted, the chances are interruptible gas sales to coal's industrial markets will become more and more unprofitable and eventually disappear.

Finance—Along with competitive problems and closely related to them, gas also has to face up squarely to another: How will the industry finance the exploration, production and marketing of new supplies? In July, 1960, AGA gave one answer:

"For the 4 yr period, [1960] through 1963, gas companies will invest \$8.4 billion in new facilities, 26% more than the \$6.7 billion expended in 1956-59 . . . An estimated 39% will come from internal sources . . . the remainder will be raised through sales of securities—45% from bonds and debentures and 15% from common and preferred stocks. These proportions may change depending on security market conditions."

AGA's answer explains where investment capital will probably come from. But it really doesn't get to the guts of the problem. A company's abilities to generate capital internally and to attract it externally are both directly related to net-income or profits performance. And the tightening profits-squeeze at the production level, for several years a natural concern of producers, is more and more taking shape as a common industry problem. If producers do not have incentives to explore for and develop new supplies, what, pipeline companies and distributors are asking, will we have to sell?

At AIME's annual meeting last February, W. B. Golush, Shell Oil Co., summed up the problem this way:

"[Producers] must intensify exploration efforts to find an annual average of 26 trillion cu ft of gas over the next 10 yr. This is needed to back up the predicted 5% annual increase in gas demand."

"Unit expenditures for finding and developing petroleum hydrocarbons have increased at a faster rate than have unit wellhead revenues per million Btu of combined domestic oil and natural gas production. In fact, at constant dollars, unit revenues for combined wellhead production have decreased."

"Wellhead prices ranging from 18

Coal-based Natural Gas When . . . Why . . . How

DR. MARTIN A. ELLIOTT, director, Institute of Gas Technology, defined the economic and research status of high-Btu-gas-from-coal in a *Coal Age* feature article, May, 1958, p 121. Interviewed in September of this year, Dr. Elliott stated his basic conclusions, still the same, are:

1. Coal will be used as a source of high-Btu-gas when the wholesale (or city-gate) Btu price of natural gas exceeds the mine-Btu price of coal by an amount at least equal to the cost of making the synthetic product and transporting it to gas markets.

2. Wholesale gas prices in New England are now almost double the national average. Because of this and because supplies of coal are closer to New England than natural gas, base-load high-Btu gas from coal might become competitive there sooner than in other regions of the U. S. [Another possibility is the Middle Atlantic States where the wholesale price of gas is now about 40% above the national average.]

3. Regardless of price considerations, projected demand for and estimated ultimate reserves of natural gas show that high-Btu gas from coal may go commercial in the 1970s. However, future limits on deliverability (ability to dedicate a long-range supply for long-distance transmission) may advance the date to the late 1960s.

4. The major effort in synthetic natural gas production is on coal as a raw material since it is the most plentiful fossil fuel. Process development has reached the point where further progress depends largely on construct-

ing a full-scale demonstration plant. This is now vital to anticipate future commercial needs.

5. Research has concentrated on converting coal to high-Btu gas or methane by (a) upgrading coal-derived synthesis gas and by (b) direct hydrogenation of coal pretreated to destroy its coking properties. Technology is more advanced on upgrading but hydrogenation has advantages of lower oxygen requirement and higher methane yield. Finished gas costs by either method now range from 80c to \$1 per MCF.

6. Cheaper ways must be found to produce synthesis gas from coal since its present cost accounts for 65-75% of total finished gas costs. Offering the greatest promise here is high-pressure gasification of coal in suspension with oxygen and steam. Also in the picture: A modified version of the fixed-bed Lurgi generator process. Based on noncoking coal, this process is now used in Germany, South Africa and Australia.

7. Conventional processes are available for converting synthesis gas to methane. Needed, however, are (a) catalysts more resistant to attrition or size degradation and (b) better heat control and heat recovery techniques.

8. Production of methane by direct hydrogenation of pretreated coal has been demonstrated in a continuous operation. Present cost estimates by conventional methods are about the same as in methanation of synthesis gas. But variations of conventional methods now under study may bring costs down substantially according to rough estimates.

to 25c per MCF for new gas contracts seem to offer the incentive to explore for and to develop new reserves. The average wellhead price in 1958 of 11.9c per MCF on all gas must rise to 18 to 20c within 3 yr and to 25c within 10 yr to sustain intensified exploration activities.

"In addition to firmer prices on new gas commitments, producers must receive higher prices on gas delivered under old contracts. In both cases, federal regulation of about 65% of the marketed gas production presents a number of uncertainties.

"Pending an acceptable solution to the regulatory problem, producers should aggressively pursue natural gas activities. Exploration should be con-

centrated in areas offering the required incentive prices. Sales should be made preferentially to non-jurisdictional markets, or to those interstate markets offering the greatest wellhead revenues."

Essentially, gas problems boil down to the industry's need for achieving that realignment of its price structure which will bring a happy compromise between "consumer protection" and producer incentives and still enable maximum industry growth. Ultimate solutions depend primarily on whether Congress and the Federal Power Commission are able to come up with acceptable amendments to existing controls on the production and marketing of interstate gas.

On September 28, FPC took what it hopes will be a giant step in this direction by adopting a new policy for regulating independent producers (see panel p 76). Instead of trying to make separate rate determinations for the thousands of producers involved—a policy which has brought formidable administrative headaches—the Commission says it will now decide rate cases on the basis of area-price schedules published September 28.

Whether or not FPC's new rate policy will solve basic gas industry problems is a moot question. Where the new policy results in raising consumer prices, prevailing opinion following its announcement was that new rate determinations would be a near-sure bet to arouse controversy and lead to court challenges.

If this opinion bears out, look for fresh rounds of dissension between producers, pipeline companies and distributors, lengthened shadows of doubt about the ability of the industry to develop new supplies, and continuing "unfair" competition between gas and coal—at least for the immediate future.

During the 70s: A Stake for Coal

Hardly anyone today questions the fact that the gas industry has sufficient domestic proven reserves to meet demand growth potentials for the decade ahead. In the same period, there is little concern over its ability to keep adding to such reserves at faster rates than annual consumption if prices are high enough to encourage exploration and development.

But sometime during the seventies, possibly around 1975 when annual consumption may reach 19-23 trillion cu ft or roughly double present levels, experienced energy-resource analysts expect:

1. That consumption will exceed annual additions to proven reserves.
2. That sustained future growth in demand through the balance of the century will require supplementing domestic supply with manufactured gas and imports.

Gasification—As far as manufactured gas is concerned, Dr. Martin G. Elliott, director, Institute of Gas Technology, is convinced that

coal is the strongest contender for the job. His basic conclusions on "when, why and how" coal takes priority—the same as presented by him in *Coal Age*, May, 1958 p 121—are reviewed in the accompanying panel.

While coal is still top dog, Dr. Elliott notes that hydrogasification of oil shale has recently come into the picture as a practical possibility for supplementing gas supplies. In an IGT project, now nearing the small pilot-plant stage, oil shale, like coal, is treated directly with hydrogen to produce high-Btu gas with no liquid by-products.

Oil shale could get the nod for gasification, states Dr. Elliott, in western regions within marketing range of Colorado's vast supplies of the raw material. Still larger deposits are spread out over numerous eastern states (e. g., Indiana, Illinois, Ohio, Kentucky, Tennessee) but these are of considerably lower grade. Even here, coal should take priority initially, although, over the long run, eastern deposits could move into usage in certain local situations where they are sufficiently concentrated for economic processing.

In evaluating its stake in gasification, coal should especially note these facts:

1. Research on coal-based natural gas is well advanced, but it will take 9-16 yr before proven full-scale processes can be developed.

2. To manufacture 1 trillion cu ft of coal-based gas annually, or 5% of estimated demand by 1975, 27.5 plants with a daily capacity of 100 MMCF would have to be built at an estimated cost of \$2 to 2.5 billion. These plants would need some 50 million tons of coal annually.

Question for coal executives: Isn't it time for the industry to intensify and extend its interest in gasification? Research and development costs are admittedly high but consider the payoff in the above case: A major new market for coal worth about \$250 million at today's average mine price.

Imports—Asked about the role of Canadian gas in supplementing U. S. supplies, sources close to the Canadian National Energy Board answered *Coal Age*, in substance, as follows:

There seems little doubt that potentials for increasing imports of Ca-

nadian gas are considerable for these main reasons:

1. Canada has 60 to 300 trillion cu ft of proven reserves in western gas fields and new reserves are being brought in at an annual rate of 8 to 10 trillion cu ft annually.

2. The country does not now have the industrial and residential demand to take such supplies and thus should have a continuing export surplus.

3. Supplies and transmission facilities are in a favorable position to compete price-wise with Texas and Louisiana gas in northern U. S. markets.

Although potentials are considerable, imponderable factors make firm predictions on timing and quantity difficult. This year the Board authorized maximum total export of one billion cu ft daily. From this level of export, there will be need for pause to consolidate actual and proposed plans for U. S. import purchases.

Once consolidation is made, future increases will be determined and authorized on the bases of (1) the rate of new additions to Canadian proven reserves, (2) the rate of supplies moving into U. S. and Canadian markets, and (3) on the demand and price situation in northern U. S. markets. Furthermore, since two sovereignties must supervise foreign trade in natural gas, political considerations will always be in the picture.

In sum total, IGT's Dr. Elliott puts the roles of manufactured gas and imports in this perspective:

"The long-range supply of gas is assured by our estimated future recovery of natural gas, supplemented by production of gas from coal and oil shale. If the annual growth rate in demand for gas averages between 2 and 3% from now to the end of the century, supplemental gas will be required in the latter part of this century. Even if present estimates of the future recovery of natural gas are much too low, it is still highly probable that supplemental gas will be required after 1980.

"Imported liquefied natural gas and pipeline gas from Canada and Mexico could be helpful sources of supplemental gas, but they cannot be relied upon as a source of long-range supply. Processes for making supplemental gas from coal and oil shale are feasible and under development. At the present level of effort, and

assuming a progression of larger-scale plants, the gas industry will have the plants, the gas industry will have an economical source of supplemental gas when it is needed."

Research: Catalyst For Future Growth

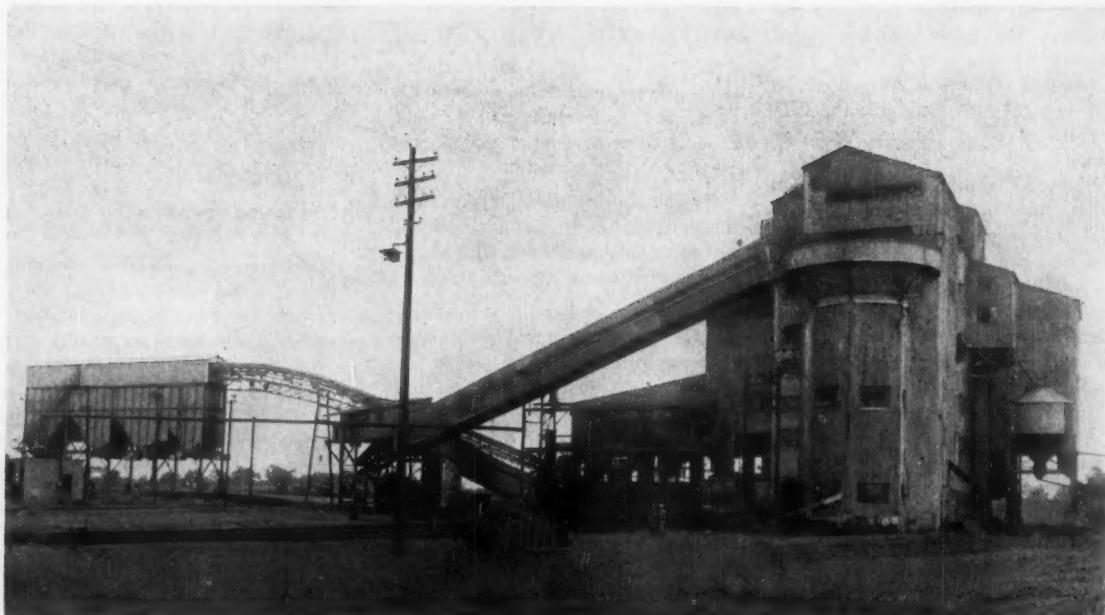
IGT's vigorous gasification program is typical of the industry's enlightened approach to research as a primary need for combatting competition and for fulfilling the promise of its future.

Implementing this approach, gas is now planning a major upscaling in research expenditures. On cooperative research alone, the industry, through AGA, spent \$1.8 million in 1959; this year's outlay is put at about \$2.5 million. And, highlighting future plans before the New York Society of Security Analysts, May 4, 1960, Wister H. Ligon, AGA president, stated:

"The announced goal is to triple the industry's research activities within the next 5 yr. In so doing, we will step up our efforts toward development of new and better equipment with which to improve our competitive position, new and improved techniques which will result in more efficient gas system operations, and new methods for producing synthetic gas."

Included among current research efforts by AGA, equipment manufacturers and others are projects aiming at a fold-away gas oven to complement fold-away top-burners already on the market; smaller, cleaner and more efficient burners for gas ranges; a combination gas oven and water heater; improved gas refrigerators and air-conditioning systems; various thermionic and thermoelectric devices which would make gas appliances independent of outside power; and better techniques for use of natural gas in the blast furnace to boost pig-iron output and reduce coke requirements.

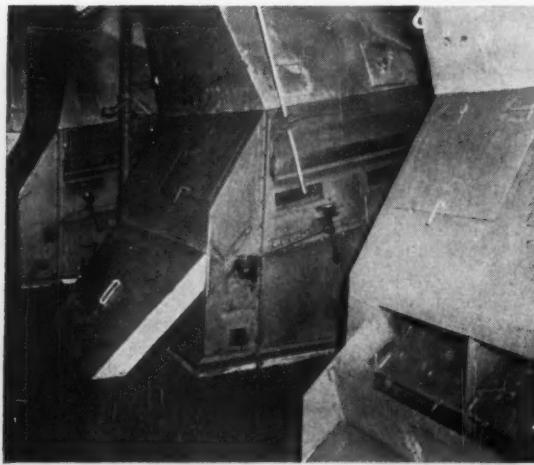
There's an old saying: "The future goes to those who prepare for it." With such an aggressive research program, backed by hard-hitting merchandising effort, it would be difficult to deny that gas is preparing to cash in, one way or another, on its future potentials in spite of current and long-range problems which threaten progress.



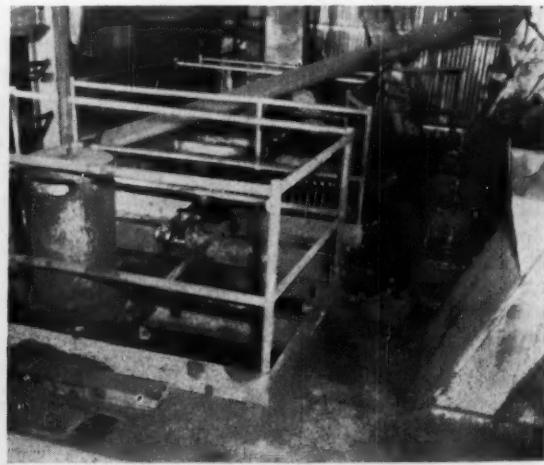
MODERN FACILITIES featuring dense-medium washing enable Bell & Zoller to provide metallurgical coal for the Middle West. Air tabling of fines and jig washing of middlings and refuse from primary cleaning round out preparation units.

Better Preparation: Gateway to New

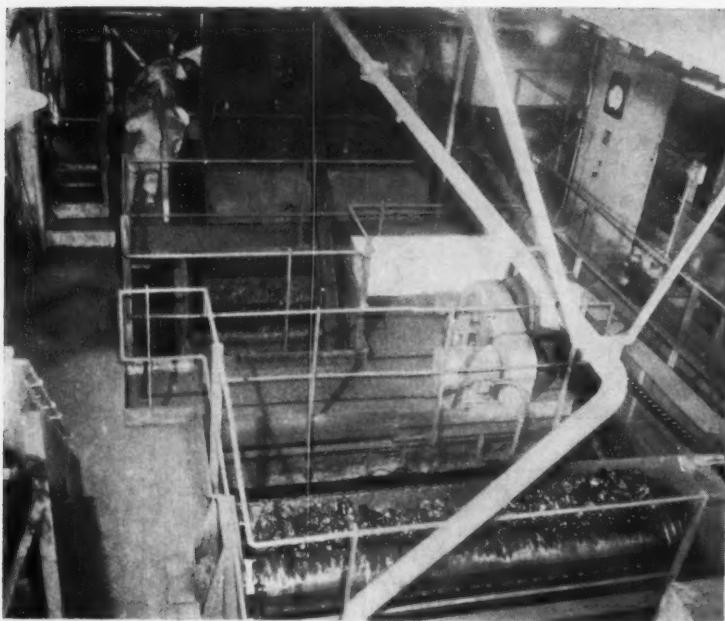
Replacing obsolete equipment and eliminating a 3-mi overland haul for raw coal, Zeigler No. 3 plant employs heavy-medium washing to recover metallurgical coal in the primary circuit. Air tables and jig clean fines and middlings.



AIR TABLES clean 1x0, which is presized into 1x $\frac{1}{2}$, $\frac{1}{2}\times\frac{3}{16}$ and $\frac{3}{16}\times 0$. Damp fines may be diverted to jig washer.



JIG PROCESSES MIDDLELINGS and refuse from dense-medium washer and air tables as final step in coal cleaning.



DENSE-MEDIUM WASHER operating at 1.37 specific gravity recovers 7x1 coal for metallurgical market. Magnetite is fed automatically to the washer.

Marketing Opportunities

BETTER PREPARATION has opened the door to metallurgical markets for Bell & Zoller's Zeigler No. 3 coal while solidifying its position in present domestic and industrial markets. Incorporating three-stage washing, the Zeigler No. 3 plant features a Dutch States Mines heavy-medium washer, Roberts & Schaefer Stump Air-Flow

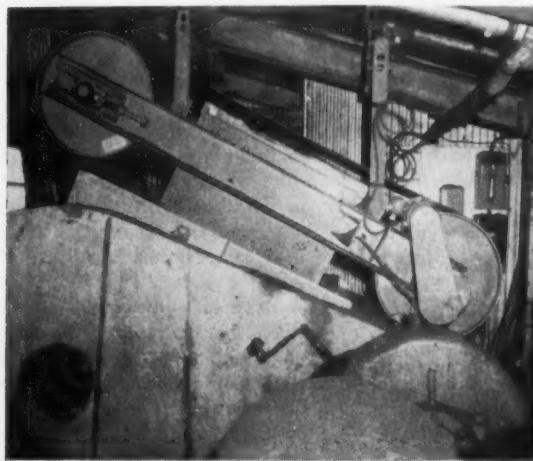
tables and a McNally-Pittsburg Jig. Operating two shifts per day, these units process 6,000 tpd for shipment to markets over the Chicago, Burlington & Quincy, Missouri Pacific and Illinois Central railroads.

Before the Zeigler No. 3 plant was built at the mine site raw coal was shipped 3 mi by rail and cleaned at

the Zeigler No. 2 plant. After the No. 2 mine was depleted and closed B&Z continued sending the No. 3 coal to the No. 2 plant. But several important considerations led management to plan construction of washing facilities at the No. 3 mine: the time and manpower required to move coal to the No. 2 plant; obsolescence of the No. 2 plant, and the desire to upgrade No. 3 coal to maximum quality.

Before selecting the new preparation facilities Bell & Zoller employed the Commercial Testing & Engineering Co. to make a series of washability and coking tests on samples of the Illinois No. 6 seam from Zeigler No. 3. These tests showed that considerable low-sulphur metallurgical coal could be recovered at 1.37 gravity, and domestic and industrial grades at higher gravities. Such a separation will enable the company to find new markets in the steel industry.

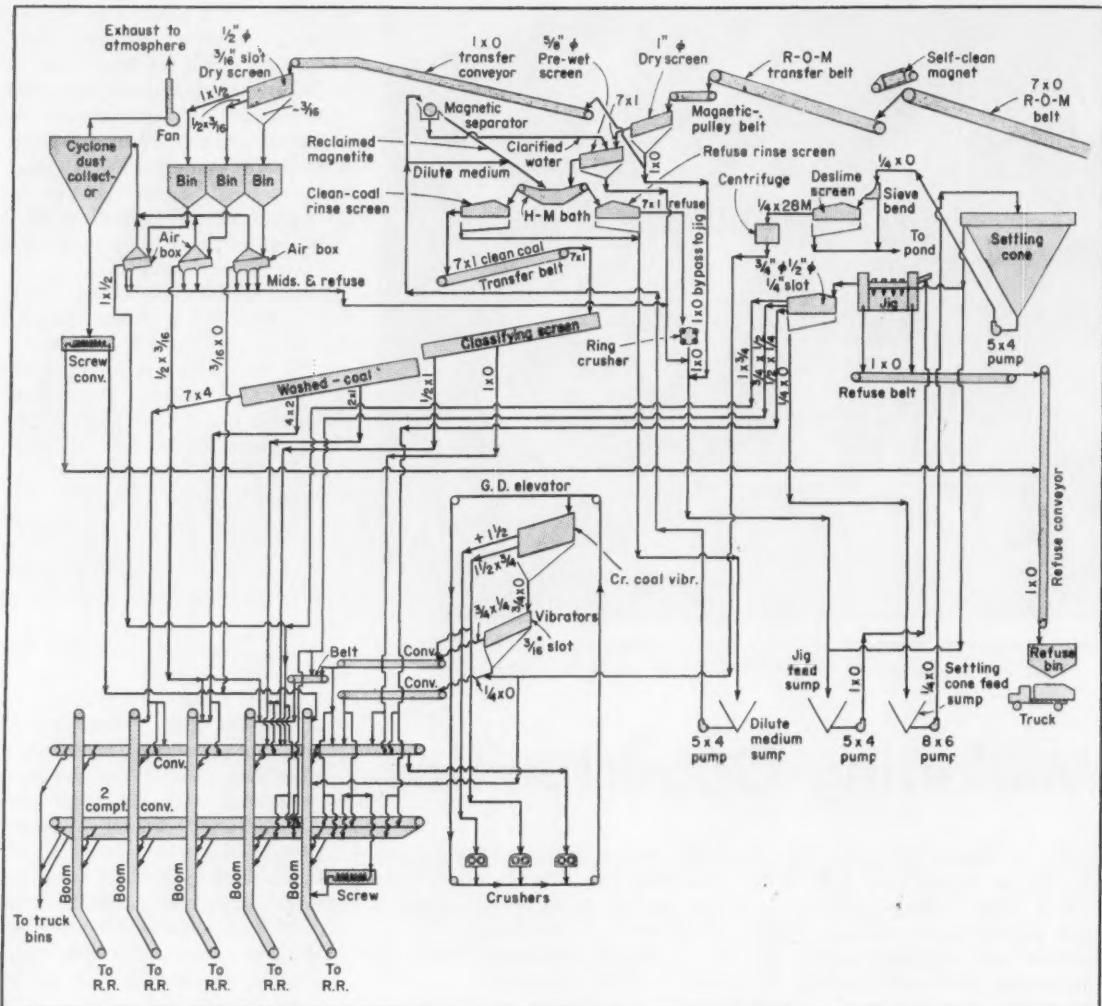
Bell & Zoller executives then consulted with Roberts & Schaefer engineers to select washing equipment which would have a high over-all efficiency and recover a maximum of metallurgical coal. These engineers recommended that the preparation circuit be built around a heavy-medium washer which would recover the metallurgical fraction from 7x1 raw coal, include air tables for cleaning 1x0 fines and a jig for secondary washing of coarse and fine middlings and refuse. The units selected for the washing job included a Dutch States Mines heavy-media unit for the 7x1, Roberts & Schaefer Air-Flow tables



SELF-CLEANING MAGNET suspended above slope belt removes tramp iron from coal before it reaches raw-coal screens.



MAGNETIC SEPARATOR reclaims magnetite from rinse-screen underflow for recirculation to dense-medium bath.



COAL FLOW at Zeigler No. 3 includes three washing circuits and additional crushing and rescreening circuits. Maximum flexibility in loading is provided by two mixing conveyors and five loading booms.

for 1x0 and a McNally-Pittsburg jig for secondary washing of primary middlings and refuse.

To minimize construction costs Bell & Zoller bought an old preparation plant whose structure and much of its conveying, crushing and screening equipment could be salvaged and converted for service at Zeigler No. 3. Originally designed and erected by Roberts & Schaefer, the old structure was disassembled, moved and erected with necessary alterations at the Zeigler No. 3 site.

Since going into operation more than a year ago the company reports that the No. 3 plant has operated at consistently uniform high efficiency with an average of only 1½% float in the refuse. To further improve plant per-

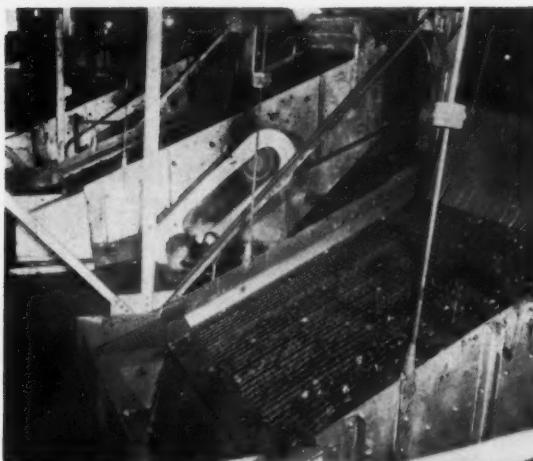
formance the company added a Bird-Humboldt centrifugal dryer in August, 1960. Additional flexibility of operations is attained through raw-coal storage facilities. The facilities make it possible to divert raw coal to a stacker belt for storage on the ground. A reciprocating feeder in a recovery tunnel delivers stored coal to a recovery belt for return to the plant feed belt.

Zeigler No. 3 employs four mining conventional units two shifts per day to produce 6,000 tpd from the Illinois No. 6 seam. All four sections are mining in areas where the sulphur content is low and all units will be in these areas for 3 yr or more.

Coal travels from belt panels to a 250-ton underground bin in ACF 8.5-

ton dropbottom mine cars. A twin reciprocating feeder delivers the raw coal to a McLanahan & Stone single-roll crusher that reduces it to 7 in top size. A pan conveyor receives the crusher product and transfers it to a 36-in slope belt for elevation to the preparation plant. A Dings self-cleaning magnet removes tramp iron from raw coal as it approaches the belt head.

The slope belt discharges onto a 42-in belt that elevates and carries the coal to the top of the plant. There it feeds onto a short 6-ft magnetic belt that removes any tramp iron missed by the first magnet. Coal then flows to an Allis-Chalmers 6x14-ft Ripl-Flow raw-coal sizing vibrator making a separation into 7x1 and 1x0.



THREE VIBRATORS in clean-coal crushing and rescreening circuit make initial separation into plus 1½ in, 1½x¾ and ¾x0.



MEETING in Zeigler No. 3 office are Wesley Smith (left), preparation engineer, and Edmund Grezlak, superintendent.

Heavy-Medium Washing

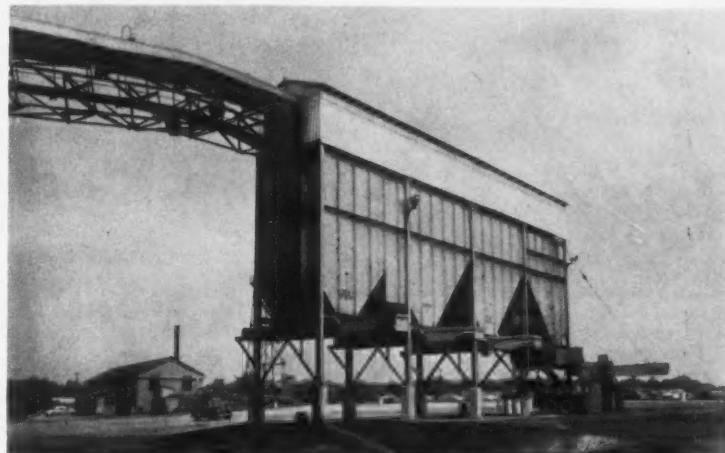
The 7x1 product flows to a second 6x14-ft vibrator for prewet screening at ¾ in before passing to the Dutch States Mines heavy-medium unit operating at 1.37 specific gravity. Clean coal flows to an Allis-Chalmers 6x16-ft Low Head vibrator equipped with Wedge Wire screen for magnetite removal. Rinsed coal discharges onto a transfer belt that carries it to the washed-coal classifier screen for separation into 7x4, 4x2, 2x1½, 1½x1 and 1x0 sizes. All of these products may be loaded separately, mixed in various combinations or crushed.

Refuse and middlings from the heavy-media washer discharges onto an Allis-Chalmers 4x14-ft Ripl-Flow vibrator rinse unit for magnetite removal.

Density Control

To maintain the specific gravity of the magnetite-water medium within narrow limits, the Zeigler No. 3 plant uses Foxboro instruments to automatically feed magnetite into the circuit. When the specific gravity of the solution falls below the desired level, the instruments start a Syntron feeder that adds magnetite to the reclaimed magnetite as it flows to the bath.

If the specific-gravity indicator on the plant control board shows that the specific gravity is higher than normal, the plant operator adds more dilute



FOUR BINS adjacent to the plant hold 100 tons each and serve retail and truck customers. Coal is oil treated as it falls on conveyor over bins.

medium to the circuit until the gravity returns to normal.

Medium Recovery

Underflow from the heavy-medium refuse and clean-coal screens flows to a common sump. From there an Allis-Chalmers 4x5 pump delivers it to a Dings drum-type magnetic separator. Concentrated magnetite is flumed to the dense-medium washer and the clarified water is recovered for prewet rinsing on the raw-coal vibrators.

Jig Washing

After passing through an American ring crusher that reduces it to 1x0, the heavy-medium middlings and ref-

use flows to the jig sump where it mixes with middlings and refuse from the air tables. The combined products are picked up by an Allis-Chalmers 5x4 CW pump and delivered to the McNally jig for rewashing at 1.50 specific gravity.

Clean 1x0 from the jig discharges onto a 6x16-ft Low Head vibrator making a separation into 1x¾, ¾x½, ½x¾ and ¼x0 sizes. The three larger sizes pass to the mixing conveyor for loading separately or mixing before loading. The ¼x0 passes to the feed sump from which an Allis-Chalmers 8x6 CW pump transfers it to a settling cone.

A 5x4 CW pump at the base of the settling cone delivers the concentrated ¼x0 to a Sieve-Bend screen ahead of

a 5x6-ft Low-Head desliming screen equipped with Bixby-Zimmer 28-mesh screen cloth. Deslimed $\frac{1}{4} \times 28M$ passes to a Bird-Humboldt centrifugal dryer for final dewatering before loading. Underflow from the desliming vibrator flows to a settling pond.

Air Cleaning

The 1x0 from the raw-coal screen passes to a scraper conveyor feeding two Allis-Chalmers Ripl-Flow vibrators. These units split the raw feed into

1x $\frac{1}{2}$, $\frac{1}{2} \times \frac{3}{16}$ and $\frac{3}{16} \times 0$ sizes, which are delivered to separate 15-ton storage bins. Each bin feeds a Roberts & Schaefer Air-Flow table. Clean table products combine with the clean products from the jig washer and are conveyed to the loading booms. The jig products also may be mixed in various combinations or combined with products from the heavy-medium washer before loading.

Reject from the air tables mixes with crushed middlings and refuse

from the heavy-medium washer and flows to the jig-feed sump.

Crushing and Rescreening

Zeigler No. 3 has an independent crushing and rescreening circuit that includes three McNally-Pittsburg Gearmatic crushers, three Allis-Chalmers Ripl-Flow primary crushed-coal sizing vibrators and six Tyler Hummer secondary crushed-coal screens. A gravity-discharge elevator collects crushed coal and elevates it to the primary crushed-coal vibrators. All vibrators in the rescreening circuit are equipped with Ludlow-Saylor and Tyler screens.

Any fraction or all of the sizes larger than 1 in may be diverted to the bottom strand of a single-compartment mixing conveyor and delivered to one of the Gearmatic crushers for reduction to $\frac{1}{2} \times 0$. The gravity-discharge elevator delivers this product to the primary crushed-coal vibrators where it is split into plus 1 $\frac{1}{2}$ -in, 1 $\frac{1}{2} \times \frac{3}{4}$ and $\frac{3}{16} \times 0$ sizes. The plus 1 $\frac{1}{2}$ -in returns to a second Gearmatic crusher for recrushing and subsequent delivery to the crushed-coal vibrators. The 1 $\frac{1}{2} \times \frac{3}{4}$ may be routed to the third Gearmatic crusher for further reduction or mixed with $\frac{3}{16} \times \frac{3}{4}$ from the crusher circuit and delivered to cars.

Six Tyler Hummer screens receive $\frac{3}{16} \times 0$ from the primary crushed-coal vibrators and separate it into $\frac{3}{16} \times \frac{3}{4}$ and $\frac{1}{4} \times 0$ fractions. The larger size may be loaded separately or mixed with other grades and the $\frac{1}{4} \times 0$ can be loaded with carbon from the air tables or mixed with other grades.

To meet the demand for domestic and stoker coals, the Zeigler No. 3 plant has four 100-ton retail bins. A distributing conveyor receiving coal from a belt, spans the bins and delivers coal to the proper units. Sizes stored include 7x4, 1x $\frac{3}{4}$, $\frac{3}{16} \times \frac{3}{4}$ and $\frac{1}{2} \times \frac{3}{16}$.

All sizes except $\frac{1}{4} \times 0$ can be treated with hot oil. The plant also sprays hot wax on the Super-X stoker coal. Retail coal is oil-treated as it discharges onto the distributing conveyor or spanning the storage bins.

Continual sampling throughout the shift, either by shipment or by size, makes it possible to provide management with daily analyses of coal shipments. The company's central laboratory at Johnston City analyses all samples. The plant sampler also makes regular float-sink tests to check coal-cleaning efficiency.



haulage capacity...

Place: Powhatan #1 Mine

Operator: North American Coal Corporation

Car Dimensions: Length 21' 6" (body)
Width 6' 6"
Height 42" (above rails)
Weight 8200 lbs.

Capacity: 395 cu. ft. (level load)
465 cu. ft. (crown load)

where can you match it?

Since 1915 —
Pioneers in
haulage equipment





The Perfection Steel Body Co., Galion, Ohio, built 10 Alcoa® Aluminum frameless trailer dump units for Stuedemann Trucking, of Caledonia, Wis. These replaced 15 of 21 steel units hauling sand and gravel. Results: payload up, operating costs down, working capital saved!

Extra legal payload of 3,740 lb is aluminum's unit-for-unit advantage over six remaining steel trailers, scheduled to be replaced by aluminum soon. Even at \$.72 a ton, Stuedemann figures on an extra \$53.60 profit every week per unit. More astonishing is each new trailer's

margin over the steel unit it replaced. Under revised Wisconsin highway load limits, net is up *seven tons*—nearly half again the payload hauled before.

Replacing steel trailers two for three, high-capacity aluminum dumpers save Stuedemann about \$100,000 of invested capital, and depreciation on that equipment. Another \$39,000 is gained annually on wages, insurance and licensing.

Aluminum's bonus benefits also include triple the impact strength of steel for longer life with less maintenance; built-in resistance to corrosion from commonly hauled bulk materials (*no painting!*).

Free dump body folder tells how many operators have increased profits by switching to aluminum. For your copy, write Aluminum Company of America, 1776-L Alcoa Building, Pittsburgh 19, Pa.



Thirty-foot Alcoa Aluminum dump trailer, built by the Perfection Steel Body Co., was sold to Stuedemann Trucking by Freighauf Trailer Co., Milwaukee. Rig scales only 23,260 lb empty. Averaging eight trips daily, each aluminum dumper carries some two tons more payload than a steel unit grossing the same 73,000 lb, quickly repays its small premium cost . . . plus!

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

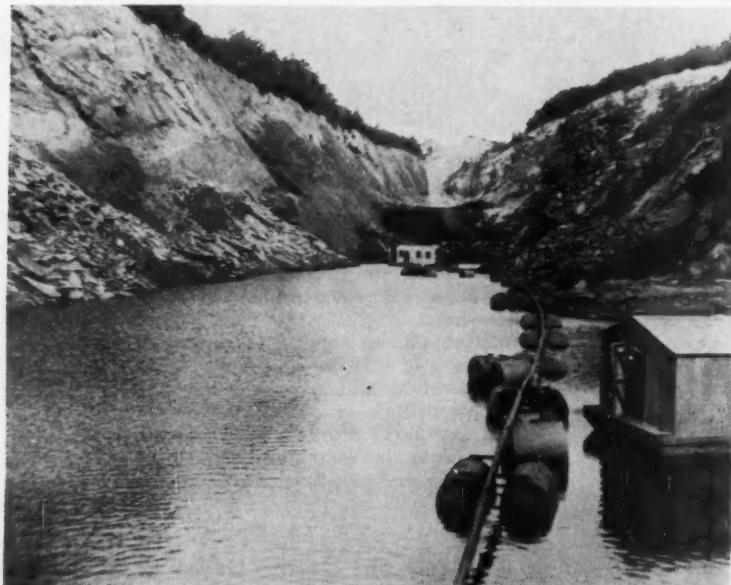




FLOATING DREDGE at McAdoo, Pa., near Hazleton, sucks valuable power-plant fuel in the form of anthracite fines from the bottom of a strip-mine lake. The machine, operated by Manbeck Dredging Co., produces up to 150 cu yd per hr.

Upland Dredging for Power Fuel

Washery solids containing fine coal are reclaimed from old strip pits



PRODUCT of the dredging operation is pumped through an 8-in floating pipeline to scalper and pumps on shore.

ONE WOULD scarcely expect to come upon a floating dredge at work in the mountains near Hazleton, Pa.—but there it is, cutting and raising excellent power-plant fuel from the bottom of a strip-mine lake. At last reckoning, the lake-bottom deposits had yielded approximately 700,000 tons to the equipment of Manbeck Dredging Co., headed by Charles D. Manbeck, Schuylkill Haven, Pa.

During World War II the pit was used as a disposal basin for washery effluent from an anthracite cleaning plant that operated nearby. It is estimated that 1,200,000 tons of plant "tailings" were sluiced into the pit during that period. Included in this was a large proportion of coal in the finer size ranges which did not become widely marketable until after the war. Much of the present recovery is in the minus 200M sizes, making it particularly useful in pulverized firing.

Carbon out of the mine, on the ground, always is a commodity of great value, but in this instance anthracite's well-known water problem complicated the recovery of the carbon. The abandoned strip pit is open to worked-out underground levels, thus it receives a large volume of inflow from these sources as well as from normal precipitation and surface drainage. The lake covering the deposits of fines is the result.

The dredge employed by the Manbeck organization is an 8-in portable unit known as the Dragon Model 130-H, furnished by Ellicott Machine Corp. The hull consists of two rectangular-section, tanktype pontoons with assembled dimensions of 34 ft in length, 14 ft in width and 4 ft depth. The cutter can work at a depth of 17 ft below the surface of the water at a rated output of 150 cu yd per hr.

The material sucked up by the hydraulic cutter is pumped through an 8-in floating pipeline (up to 1,500 ft long) to a series of three shore pumps which raise the material 200 ft to a settling dam on the original surface. The pump on the floating dredge is driven by a 154-hp (1,800 rpm) General Motors diesel engine, and it is capable of handling solids up to 5 in in size. As a matter of fact, the pump has handled material containing up to 90% solids, more in the manner of an extrusion than a stream, the operators report.

The floating pipeline supported on cylindrical-tank pontoons, ends in free discharge to a screen on the shore which scalps and rejects large solids such as rock and wood. Underflow of the screen enters a surge tank to feed the first of the shore pumps.

Dewatered coal in the settling basin is reclaimed by dragline and loaded into trucks for transfer to a railroad loading ramp. Up to 30 railroad cars per day have been shipped to generating plants of Pennsylvania Power & Light Co.

The dredging operation is the most practical way of recovering the deposit of fines. The nature of the terrain and the depth of the pit rule out the use of conventional excavators and truck haulage. Furthermore, the solid packing of the fines at the bottom of the lake would make recovery difficult by conventional means. The dredge, on the other hand, could be transported piecemeal



NATURE OF TERRAIN and depth of pit limit the possibilities of recovering the material using conventional excavators and trucks.



SERIES OF PUMPS raises recovered fines to settling ponds 200 ft above the surface of the lake. Scalping screen is in foreground.

to the bottom of the pit and assembled on the shore of the lake.

In action, the cutter removes a 16-in layer from the top of the lake-bottom deposit. The entire floating unit is maneuvered by selectively lowering or raising a pair of spuds at the aft corners of the hull through

the use of hydraulic takeoffs from the engine, then rotating the entire dredge about the anchored spud.

The Manbeck application of the dredge is an ingenious solution to the problem of recovering these valuable solids at a time when power-plant appetites for fuel are growing.

Minnehaha Mine averaged 2700 tons of raw coal per day with two units of Jeffrey equipment working two shifts per day over a period of 22 months.



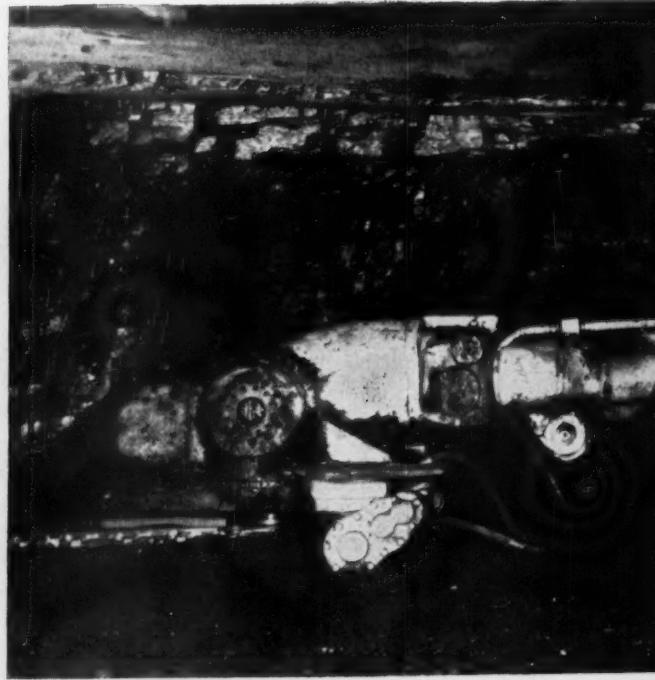
"Performance miraculous; costs reasonable"

Impressive results with Jeffrey equipment—drilling machines, shuttle cars, loading machines, cutting machines—are reported by the Minnehaha Mine of Fairview Collieries Corp., Sullivan, Ind. Management states that maintenance costs have been exceptionally low—and performance way beyond expectation.

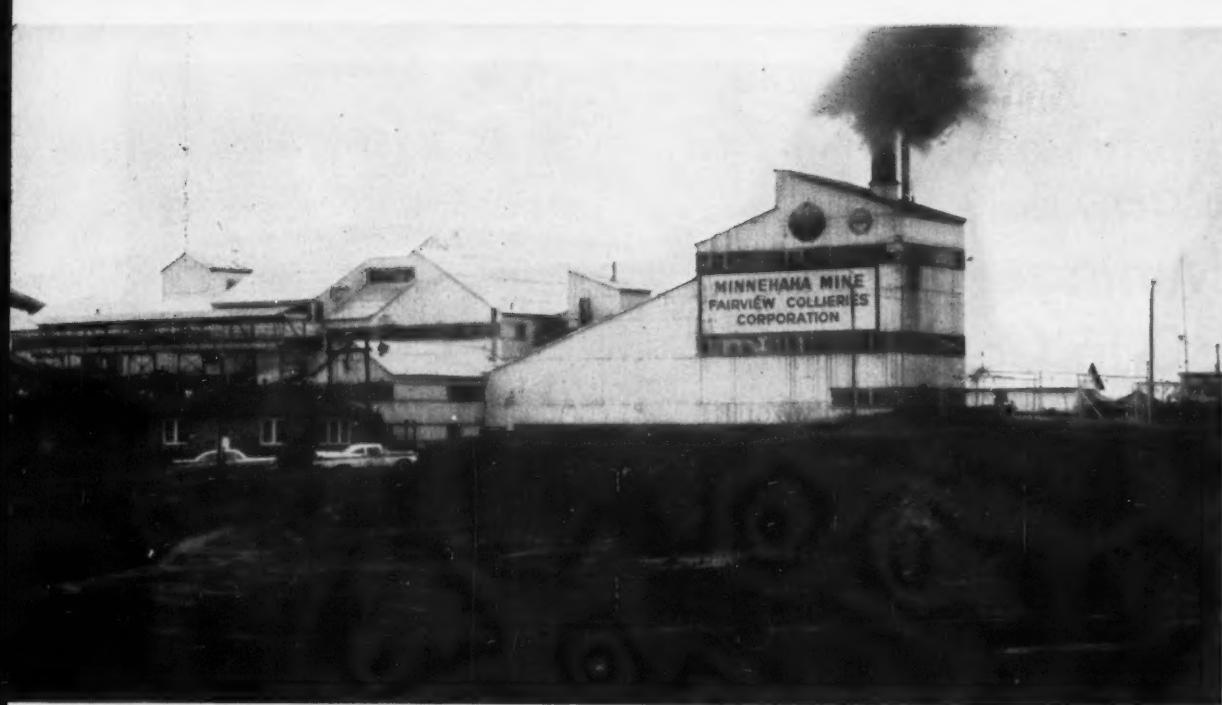
SYSTEM PLANNING—The wide range of Jeffrey equipment in use was chosen on recommendations of an experienced Jeffrey sales engineer. While each unit is a solid performer itself, it takes experience to match and integrate the various pieces of equipment to give top performance of the whole mining system. Jeffrey analyzes the complete job—and comes up with recommendations to help you realize low-cost production.

ONE-STOP SERVICE—Standardizing on Jeffrey equipment streamlines maintenance and ordering of renewal parts, too. Minnehaha gets top-notch service from the Jeffrey warehouse in Evansville. Here, replacement parts are stocked for immediate delivery.

Use the Jeffrey system-planning approach—you'll find it pays off. The Jeffrey Manufacturing Company, 912 North Fourth Street, Columbus 16, Ohio.



Jeffrey 70-UR Cutting Machine.



with conventional Jeffrey units at Minnehaha



MINING • CONVEYING • PROCESSING EQUIPMENT...
TRANSMISSION MACHINERY...CONTRACT MANUFACTURING



JEFFREY

Deep Mining 30-In Coal In Virginia

Seams ranging from 24 to 30 in in height require special equipment and unorthodox mining methods to produce coal economically in southwestern Virginia. Here's how Jewell Ridge Coal Co. mines the Jewell seam at one of its operations.

EQUIPMENT is an important factor in producing coal at the No. 10 mine of Jewell Ridge Coal Co., Jewell Valley, Va. Equally important are the mining methods which must be adopted to obtain an efficient operation. Because of seam conditions and location it is desirable to keep the mine relatively small. Daily tonnage—one shift—at this operation ranges from 250 to 300 tons.

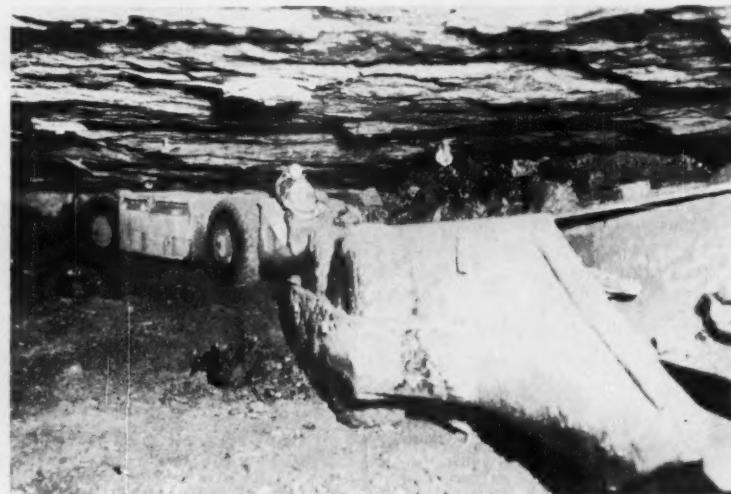
The methods and equipment employed by Jewell Ridge to mine the 30-in Jewell seam are not uncommon in the southwestern section of Virginia. The state has 1,338 mines producing from 1,000 to 50,000 tons annually. Mines producing 50,000 to 500,000 tons annually number 63 (USBM MMS 2974).

Mining Practice

The five-heading system is used in main entry and panels. Headings are driven 22 ft wide on 60-ft centers. Panels are 25 ft wide on 60-ft centers. Rolls are common in the Jewell seam



SPECIAL LOADING MACHINE is 24 in high. Two types of loaders were used in making this 30-ft long machine for work in low coal at increased loading rate.



HAULAGE UNITS include battery-powered tractor and 4-ton car. Car is taken outside, end dumped and brought back by same tractor on short hauls.

which further complicates mining practices. Plans must often be altered when these conditions are encountered.

Roof conditions are fair. The top consists of 8 to 18 in of draw slate which is supported by 30-in bolts and timbers. Cross bars are used when necessary. The roof-support plan calls for setting timbers and bolts on 4-ft centers.

Stopers are used to install bolts. Line timbers in haulageways are set so that tractors have 16-ft roadways.

Coal is cut with an 11B Sullivan machine equipped with a 9-ft bar. The machine is moved on a Joy T2 truck.

After each place is cut the machine crew drills four and five holes in the 22- and 25-ft wide entries, respectively. Each hole is charged with four sticks of powder.

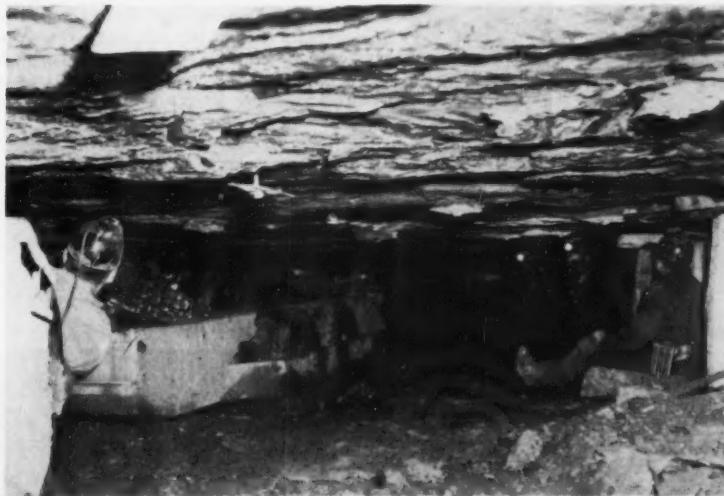
A specially designed loading machine is used to load coal. It is a cross between a 20 BU and 14 BU-7AE Joy loader and is only 24 in high. The boom and head sections are from a 14 BU and the main frame from a 20 BU.

The special loader loads 4-ton Kersey Model 75 Coal cars in 1½ min. Cars are pulled by battery-powered Kersey Model 744 mine tractors.

When haulage distance from the



APPROXIMATELY 20 MIN, on a 3,000-ft haul, are required to reach the outside (left), dump (center) and return to the section (right). As distance increases additional tractors and cars are added to offset travel time.



LOADING AND HAULING UNITS measure approximately 60 ft during the loading cycle. Maneuverability in low coal is an outstanding feature of this equipment.

face to the dump and storage bin (outside) is short—up to 1,500 ft—each tractor pulls one car. Tractors pull from the loader, haul to the outside, unload the car and return to the section.

On long hauls—1,500 to 3,000 ft—haulage equipment consists of four tractors and 15 trail cars. Two tractors are used at the face to gather loads and distribute empties and two are used to haul to the outside. Tractors can handle four to five cars, depending on haulage conditions. On a 3,000-ft haul, the tractors can complete a round trip in about 20 min.

Cars are unloaded at a 200-ton

storage bin. A 20-ton truck hauls the coal to the preparation plant for cleaning and sizing.

Batteries are changed in the tractors in midshift, especially when hauls are long. Tractors used for gathering loads and distributing empties, as well as those used on short hauls, can complete a shift with one set of batteries.

Section Crew—Nine men and a foreman make up a section crew. However, this number will vary as haulage distance increases or decreases. As the distance increases more tractors and cars are needed to offset the time required to make a round trip. Fewer tractors and cars are needed as

haulage distance decreases. The standard crew lineup is as follows:

Loading-machine operator and helper.

Cutting-machine operator and helper. (This crew also drills and shoots.)

Stopper operator and helper.

Three tractor operators.

Electrician.

When haulage distance requires additional tractor operators and when two tractors are used to gather loads it is necessary to have an extra man on the section to help make up trips and place empties.

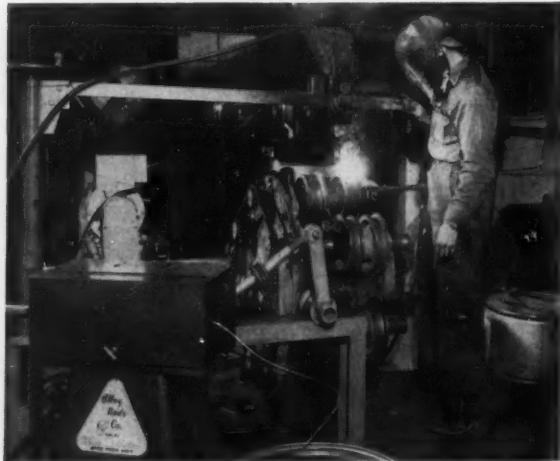
Haulage Equipment

Designed especially for low coal the heavy-duty tractors are equipped with four-wheel drive and four-wheel steer and brake mechanisms. The front and rear axle assemblies are mounted on coil springs for better traction and to reduce operator fatigue. The differential ratio is 5.87:1 and is rated at 6,000 lb per axle.

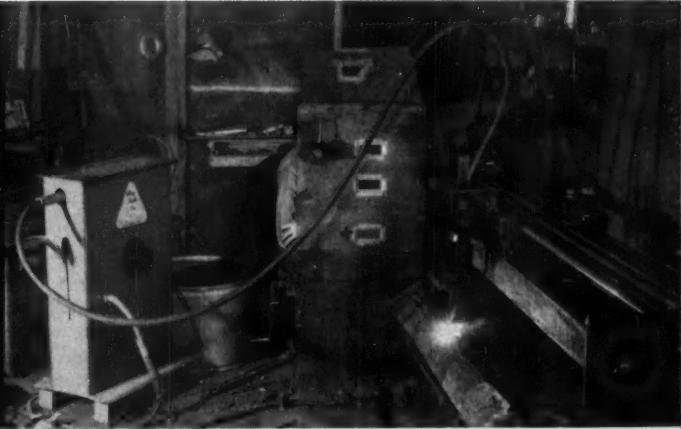
The differential features a power-lock mechanism for front and rear wheels. When one wheel slips the differential locks and prevents the tractor from losing traction. The draw-bar pull is 5,250 lb for starting.

The tractor has two speeds. The first point provides a speed of 3 mph and the second, 6 mph.

A standard series-wound 10-hp motor with glass insulation in the armature and field coils is used to withstand high temperature.



Enterprising Raymond Steele, always alert to new time saving methods, constructed this six spindle roller rebuild utilizing the Wear-O-Matic open arc hard surfacing process, greatly increasing the efficiency of his operation. Geared to the constant feed of Wear-O-Matic alloys from 100 pound Weld-Paks, this machine turns out roller after roller rebuilt and hard surfaced with long wearing deposits.



Equipment too large or cumbersome to be moved to the shop for rebuilding can be hard surfaced semi-automatically at the job site. The versatile Wear-O-Matic Wire Feed Unit and Weld-Pak is easily transported for field application of Wear-O-Matic wires.

By attaching the Wear-O-Matic welding nozzle to an automatic travel device, New Enterprise rebuilds crusher hammers automatically at a tremendous savings over manual applications. In addition, the weld deposit is smoother and more uniform.



New Enterprise Stone & Lime Co., Roaring Springs, Pennsylvania, operates seven plant locations in west-central Pennsylvania. This diversified, complex organization produces ready-mix concrete, pulverized rock, agricultural lime, black-top road material and pre-stressed concrete structures in addition to road and sewer construction projects and turnpike maintenance. Trucks, shovels, dozers, loaders and other movable equipment are maintained at the central maintenance shop in Roaring Springs under the guidance of Raymond Steele, Maintenance Supervisor.

Production Soars—Costs Go Down for Maintenance Shop Handling Seven Quarries

WEAR-O-MATIC PROCESS PROVIDES THE ECONOMY AND VERSATILITY NECESSARY FOR A VARIETY OF EQUIPMENT

Maintaining the equipment necessary for operating seven plant locations keeps even the well equipped, efficient shop of New Enterprise Stone & Lime Co. hustling for time saving, cost saving methods. The production per man hour possibilities of the Wear-O-Matic hard surfacing process led Mr. Raymond Steele, Maintenance Supervisor, to purchase one of the first Alloy Rods Company Wear-O-Matic Wire Feed Units. The results were so outstanding in time saving, diversified uses and superior, long-wearing deposits from Wear-O-Matic wires that New Enterprise now employs four Wear-O-Matic units in its program.

Says Mr. Steele . . . "With the Wear-O-Matic process, we put down 3 to 5 times more weld metal per hour than with stick electrodes. With no waste from left over stub ends, the semi-automatic wire costs us less per pound. Another item that saves valuable time . . . once you strike the arc with

Wear-O-Matic, you don't stop until the job is finished. You get 100 pounds of continuous electrode in each Weld-Pak, ideal for our automatic set-ups. The deposits we get with Wear-O-Matic wires really hold up. We've had better results than with any other wire we've ever tried, and we have tried most of them."

Productive capacity, operating costs, deposit quality, shop versatility are important factors for efficient maintenance operations. The Wear-O-Matic hard surfacing process provides these advantages and at a cost within the range of any shop regardless of size. Find out now how the Wear-O-Matic process can increase the capacity of your maintenance shop.

Call your Alloy Rods Company distributor or representative for a Wear-O-Matic demonstration in your own shop. Or write to Alloy Rods Company, P. O. Box 1828, York 14, Pa., for more information.

ALLOY RODS COMPANY

YORK, PENNSYLVANIA

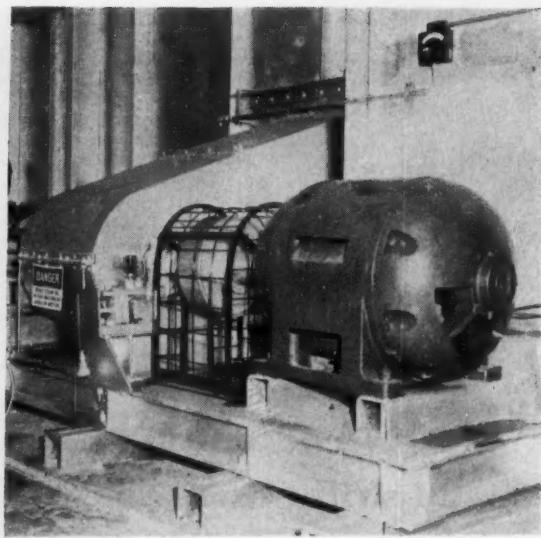
SALES OFFICES & WAREHOUSES: BOSTON, NEWARK, PHILADELPHIA, PITTSBURGH, BIRMINGHAM, CHICAGO, SAN FRANCISCO & EL SEGUNDO, CALIF.—DISTRIBUTORS IN ALL OTHER PRINCIPAL CITIES

TWENTY YEARS OF LEADERSHIP IN THE DEVELOPMENT OF QUALITY ALLOY ARC WELDING ELECTRODES

Maintenance Ideas



LUBRICATION REQUIREMENTS must be satisfied for bearings ranging in size from the small one held in the hand to the large one on the floor. The largest one cost \$2,800.



OIL-LUBRICATED BEARINGS are found on large fans (above), converters and M-G sets. These bearings receive the attention they require and as a result few failures are reported.

Bearing Maintenance: Lubrication

The life of a bearing depends in part on (1) selecting the right lubricant, (2) applying it at regular intervals and in correct amounts and (3) storing lubricants properly. A better understanding of what lubricants are made of and what they do will help make a lubrication program successful.

BEARING FAILURES are probably the largest single contributor to production downtime and maintenance repair cost. They are certainly the principal offender in motor failure, directly or indirectly. It is estimated that the coal mining industry replaces approximately 1½ million bearings annually. The average cost of a bearing is \$8 to \$10. Using these figures, the industry spends \$10 to \$13 million per year on bearing replacement alone.

Bearings do not fail without cause. Defective bearings from manufacturers and improper application by machine designers can be discounted as a cause of bearing failure. To meet the problem head-on we must acknowledge and accept the fact that improper or inadequate bearing maintenance is the real offender. And to further pinpoint the problem, im-

proper lubrication, or the lack of lubrication, is a major cause of bearing failure.

Bearing performance and the life of bearings require that a lubricating film be present at areas of contact within the bearing. Contact areas are present between the rolling elements, balls or rollers and the cage, balls or rollers and the raceways and between the cage and any ring-guiding surfaces. The absence of or an inadequate lubricating film will create high friction, thus causing bearings to fail.

Lubricants also serve to cool bearings, prevent rust and protect against contamination.

Lubrication

The importance of an effective lubrication program cannot be over-

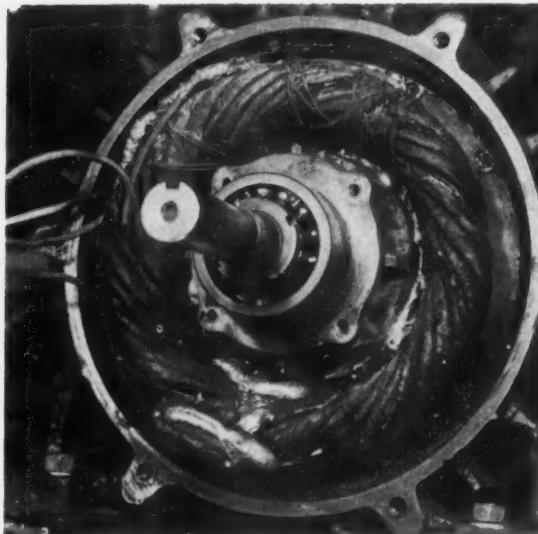
emphasized. Considerable time and effort are involved in organizing and effectuating a complete system. A thorough knowledge of the equipment, mining methods and conditions are needed before a system can be established.

Before a lubricant can be selected to do a specific job there are certain characteristics that should be known about the lubricant in addition to an understanding of the effects that coal dust, heat, pressure, water and acid have on it.

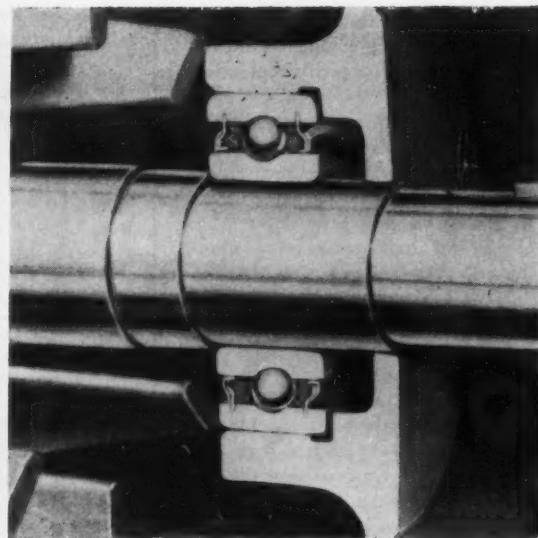
Oil Vs. Grease—Although oils contain better lubricating properties most rolling-type bearings are lubricated with grease. Both oils and greases today contain the desired properties necessary to provide low friction between sliding members; oils simply do it better.

Oils dissipate heat more rapidly, feed into the sliding area better and will carry away contaminants such as dirt and moisture more effectively.

If oil offers these outstanding properties, why then, is grease used almost universally? It is simply a matter of economics. When greases are used other advantages such as simpler housing designs, less maintenance,



BEARING FAILURE ended a 3,376-hr test of this motor operating at a 250 C hot-spot temperature. Molten metal is an indication of how hot the motor got before it failed.



BEARING HOUSINGS are one to three times the size of the bearings. The amount of grease required to properly lubricate the bearing will occupy one-half the remaining space.

better sealing against dirt and moisture and less problems with leakage offset the advantages of oils.

Oil-lubricated bearings are not used very often in the mining industry. They are, however, found on large fans, rotary converters, M-G sets and the like. Bearings on these units seldom fail. The general lubrication procedure for this system is to follow the specific instructions of the manufacturer. Following instructions and carrying out a lubrication program actually account for the long life of these bearings. If grease-lubricated bearings were to receive the same attention, they too would last much longer than they do.

We are not really concerned with oil-lubricated bearings because they are few in number and those that are in service very seldom fail. Our problem is with grease-lubricated bearings and the following discussion will be confined to just that.

Grease

Grease consists of a thickening agent in a lubricating oil. There are many types of grease, some using petroleum lubricants, others synthetics.

Soap Types—Sodium, sodium with calcium, and lithium soaps are generally used where wide-temperature-

range ball-bearing greases are needed. Greases made with these soaps are well suited for applications where wide range of speeds are encountered, high temperatures up to 250 F and long grease life.

Soda soap greases are used more on rolling-bearings. These greases have mechanical stability, good rust-preventive action and a wide temperature range.

Lithium soap greases resist action of water, contain high- and low-temperature characteristics and have good mechanical and oxidation stability. These greases are more expensive but when they give added protection to bearings operating under specific conditions the increased cost is justified.

Calcium soap greases do not have good mechanical stability when used to lubricate rolling bearings. They have good water-resistant characteristics and are less costly than other greases.

Barium, strontium and aluminum greases also are used where water resistance is an important factor.

Inorganic thickeners such as clay and silica-gel types are being developed as substitutes for soap types. These greases have nonmelting properties and are resistant to water. However, they do not qualify as a rust preventive. In addition, they create high bearing torque and do

not feed adequately to sliding points.

Consistency—Greases vary in consistency from soap thickened oil which is fluid at room temperature to greases which must be cut with a knife. The amount of oil added to the base determines body or consistency of grease. Greases are classified according to their consistency by the NLGI (National Lubricating Grease Institute) series. The numbers range from 0 to 6. The higher the number the harder the grease. There are no accepted classifications for greases outside the 0 to 6 range.

The No. 2 NLGI series is used more often to lubricate ball- and roller-bearings. The consistency of this grease causes little trouble with churning, slumping, leakage and feed to the working parts of the bearings.

Softer greases are used in multiple-row roller bearings while stiffer greases are used in large high-speed ball bearings or in double sealed or double-shielded permanently lubricated bearings.

Mechanical Stability—The ability of a grease to maintain its properties during operation is an important factor to keep in mind when selecting a grease. A grease may contain all the properties required for a specific application but not the stamina. It must have both. Consistency, for example,

Maintenance Ideas

should remain fairly constant. Churning, aerating or slumping should not be a problem under actual operation.

Lubricating Properties — A grease must maintain its lubricating properties for long periods of time. This is as important as stability. Grease loses its lubricating properties through loss of oil from the soap caused by bleeding and evaporation.

Bleeding is caused by hydrostatic pressure which forces the oil out of the base and also by squeezing which takes place when the soap structure shrinks. It is desirable to select greases which have a low initial bleeding rate and a high percentage of oil. A grease normally fails to lubricate when 50% to 60% of the oil has been lost.

Evaporation is controlled by selecting oils containing the necessary viscosity. If a grease is to be used where high temperatures are encountered it must contain a high-viscosity oil.

Oxidation Stability — Break down of grease by chemical reaction of oxygen at high temperature limits the life of grease. Oxidation produces gummy materials which harden on cooling and volatile products which result in loss of fluid.

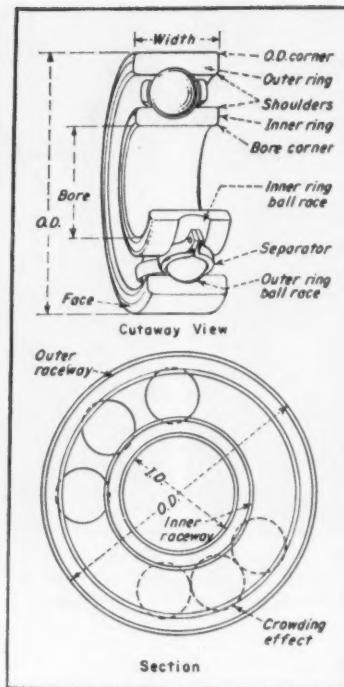
Corrosion Protection — A grease must provide corrosion protection for steel bearings. Some greases such as sodium-soap types give more protection than others. Water-insoluble thickeners such as calcium and lithium soaps, silica gel and clay types act to prevent grease from being washed away. Rust inhibitors also can be added to greases to give them the necessary corrosion-protection characteristics.

Synthetic Greases

Synthetics are the newest development in the field of lubrication. These greases are made from soaps using synthetic lubricants in place of mineral oil. Some purely synthetic greases are made with silicone.

Synthetic greases are finding more use where temperature extremes are encountered.

Silicones — Silicones have a characteristic which permits operation over a wide temperature range. They are



TWO VIEWS of a typical ball bearing show that each ball in the bearing is rolling between surfaces of two raceways. Because the diameter of the two raceways is necessarily different, some sliding action is introduced into the rotation of the balls. Each ball rotates with a speed which is not the speed of either raceway, but a different one, resulting in friction between itself and the raceways. This is where lubrication enters the picture.

classified according to the temperature at which they will be used.

They are highly resistant to water and oxidation and are non-melting. Synthetics usually cost more than conventional grease. The difficult lubrication problems common in the mining industry make their use most attractive. They not only minimize lubrication problems but also reduce the number of greases normally required for the many different bearing applications.

Silicone greases do not cause rubber swelling or deterioration and can be used where rubber seals are employed. These greases, however, have poor lubricity characteristics compared with conventional greases. This factor does not cause too much concern as long as the bearings are limited to normal operation. Radial play, loads and speeds are factors to be considered. If load and speed, for example, are increased beyond

certain limits the bearing would fail sooner than expected.

Synthetic greases are not confined to silicones alone. Diester and other types find application where special lubrication problems are encountered. Diester grease has a wide operating-temperature range, plus good lubricating properties and rust-preventive characteristics. These greases are used for double-sealed and double-shielded bearings and open bearings operating at very high speeds. Price prohibits the use of diester grease for bearings operating under normal conditions or where conventional grease will do the same job.

Grease Selection

There is more to selecting the right grease for bearings than meets the eye. A grease cannot be selected at random. A study must be made of the bearings to be lubricated and the conditions under which they operate. Once this is done, it is necessary to make a survey of the various greases to insure that the grease selected will provide the necessary protection for the bearing and also permit it to give satisfactory performance.

Greases are made to satisfy the many operating conditions of bearings. Some do their job effectively while others do not. Selection must always include consideration of consistency, viscosity, thickener and limits of mechanical and oxidation stability.

One thing to bear in mind is that while a grease has been proven satisfactory for certain bearing applications in laboratory tests it is not necessarily true that it will do the same job in the field. Followup is essential after a new grease has been applied.

General-Purpose Greases — General-purpose grease of the NLGI Series 2 consistency is normally used for most bearings. These greases usually are of the soap types.

The primary factor in selecting a grease is to make sure that it does the job—cost is secondary.

High-Speed Bearings — Greases which provide proper lubrication for bearings operating at high speed must have good channeling characteristics. Mechanical churning and

feed of lubricant at high speed are of great concern. Greases for this application should not slump. If this happens in a high-speed bearing the grease will break down to a fluid and leak out causing bearing to fail.

Sealed and Shielded Bearings—Again, the grease applied requires good channeling characteristics. If the grease does not channel quickly to provide a free path for the rolling elements, it will break down to a fluid and leave the bearing housing.

Multiple - Row Roller Bearings—Locomotive journal bearings require a softer grease—NLGI grade 0 or softer. This grade feeds multiple rows of rollers better and at the same time reduces leakage.

Greases for Wet Conditions—Soda-base greases work very well where moderate amounts of moisture from the air are present. These greases effectively absorb water and prevent it from staying in contact with steel parts. Soda soap dissolves—amount depends on how much water is present—to form a protective film on steel parts to prevent rust. If the amount of water present is excessive the bearing must be greased frequently to make up the loss of soda soap to the water.

In extreme wet conditions it may be necessary to use a water-insoluble thickener in the grease.

Application—Grease-lubricated bearings do not require complicated bearing housings and seals. Bearings are about one to three times the size of the bearings. One-half of this area should be filled with grease. If less than this is used the bearing will require more frequent servicing. If more than this is used the grease will break down, turn into a fluid and cause premature bearing failure.

Regreasing—All greases deteriorate after long usage. Bleeding and evaporation, oxidation, dirt, water and other operating factors require that bearings be greased periodically. Lubrication intervals are determined by the conditions under which the bearings operate.

It is extremely important that greasing intervals be timed accurately. If they are too close or too far apart the results will show up in

machine downtime and in an excessive number of bearing failures.

Storage and Dispensing—Most often overlooked is the storage and dispensing of bearing greases. The care

required in this phase of a lubrication program is as important as selecting the correct grease and applying it in the proper way. Keep it clean and one of the serious problems of bearing lubrication is solved.

A Handy Rule

A HANDY RULE for analyzing DC machine performance was described in a recent issue of *Westinghouse Maintenance News*. Everyone who has studied the fundamentals of DC motors and generators is familiar with Fleming's right-hand generator rule and left-hand motor rule. In these rules the thumb, forefinger and second finger are extended at right angles to each other. The thumb denotes direction of conductor motion, the first finger direction of field flux and the second finger direction of current in the conductor.

These two rules are often used in analysis of generator or motor conditions, such as, direction of rotation, field polarity and direction of current.

The following, which can be obtained from Fleming's rules has been found to be much more useful than the right-and left-hand rules themselves. This rule recognizes the fact that for DC machines there are only four fundamental conditions which can be changed:

1. Whether the machine is a generator or motor.
2. Direction of rotation.
3. Main field polarity.
4. Direction of armature current.

The simplified rule is that these four conditions can be changed only in pairs: that is, any two or all four can be changed, but one or three cannot be changed.

The rule is easily remembered and can be used in answering many questions that arise about DC rotating-machine performance and control.

For one of the simplest examples, this rule explains why a motor reverses its direction of rotation when the field is reversed. Referring to the four fundamental conditions pre-

viously listed, Items 1 and 4 do not change, therefore Item 2 must change when 3 changes.

For another example, the rule explains why the field connections of a series motor must be reversed for it to act as a regenerative braking series generator. Of the four conditions listed, 1 and 4 are required to be changed and 2 is not, therefore 3 must not be changed. But since the armature and field windings are in series, the field must have its connections reversed to keep its polarity the same (note Fig. 1)

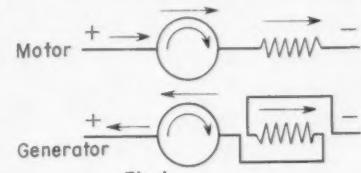


Fig. 1

Consider a DC shunt generator being used as a load for a diesel engine and feeding power into a constant-voltage shop power line. What will happen if the engine power fails? The answer is that the DC machine will become a motor and will drive the engine in the same direction of rotation. Condition 3 will not change because the field current is in the same direction. Condition 1 and 4 must necessarily change, therefore 2 will not change (note Fig. 2)

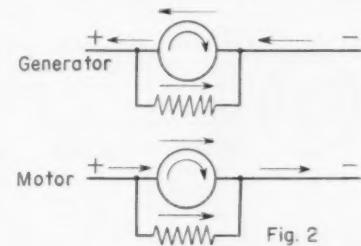
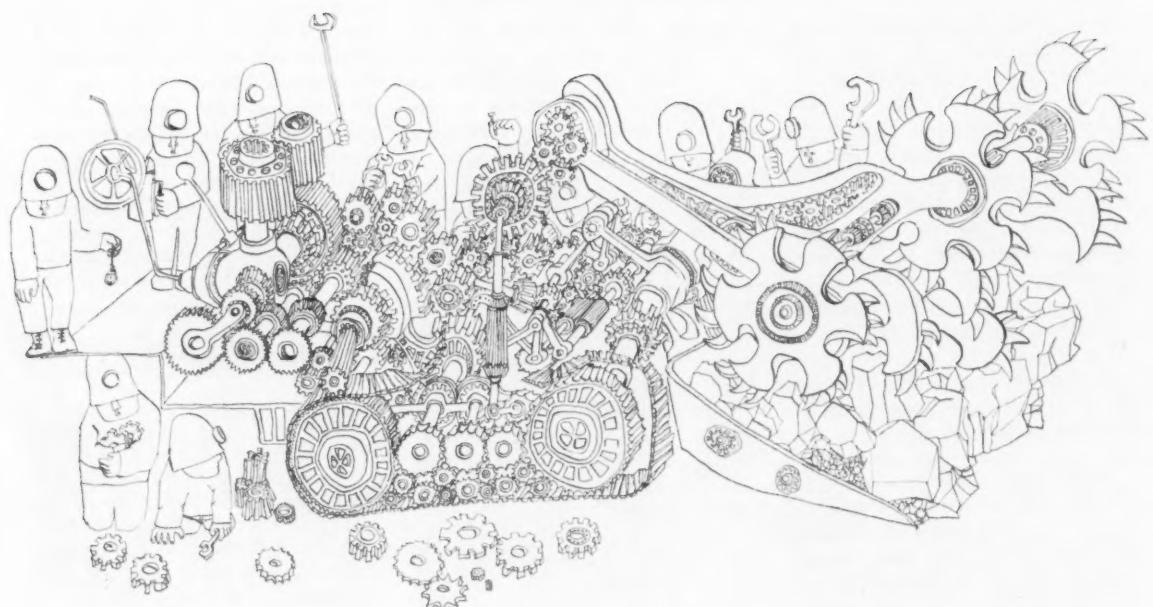


Fig. 2

Many other questions similar to these may be answered quickly by the application of this simple rule.

the digger's dilapidation



(or, How not to be a victim of tired gears)

She was a beauty when they brought her in. Shiny paint. Ferocious teeth that could chew out a whopping 5 tons of coal per minute. A drive that looked like it could rout out a vein from here to Medicine Hat, Montana, and back. At least that's the way it *looked*. Then one day fatigue set in. The old girl had tired gears. There were sounds like skis falling down stairs, a crack of doom and, wham, she stopped right in the middle of a bite. Busted gear.

Gear failure costs money, especially in terms of downtime and lost production. That's why it is essential to use *quality* alloy steel for gears, bearings, shafts and other highly stressed parts. Only the best is good enough when any failure is costly. The care and precision in making USS Alloy Gear Steels are for one purpose: prevention of failure. USS Alloy Gear Steels deliver dimensional stability. They come in a wide range of mechanical



The Lee-Norse Company's continuous coal miner will never be a victim of tired gears. Alloy steels such as 3310, 4815, 4820, 4320, 4340 and 8620 give its gears, pinions and shafts superb toughness and resistance to impact and wear. These cutter head drive gears are made of 4820, 4320 and 4817 alloy steels.

properties and processing capabilities.

Be sure to specify USS Alloy Gear Steels for *any* of your gear requirements. Carburizing steels for toughness, shock and wear resistance; through-hardening steels for heavy loads at slow and medium speeds; cyaniding and nitriding steels for wear.

For more information and prompt metallurgical assistance, call our nearest sales office or United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS is a registered trademark

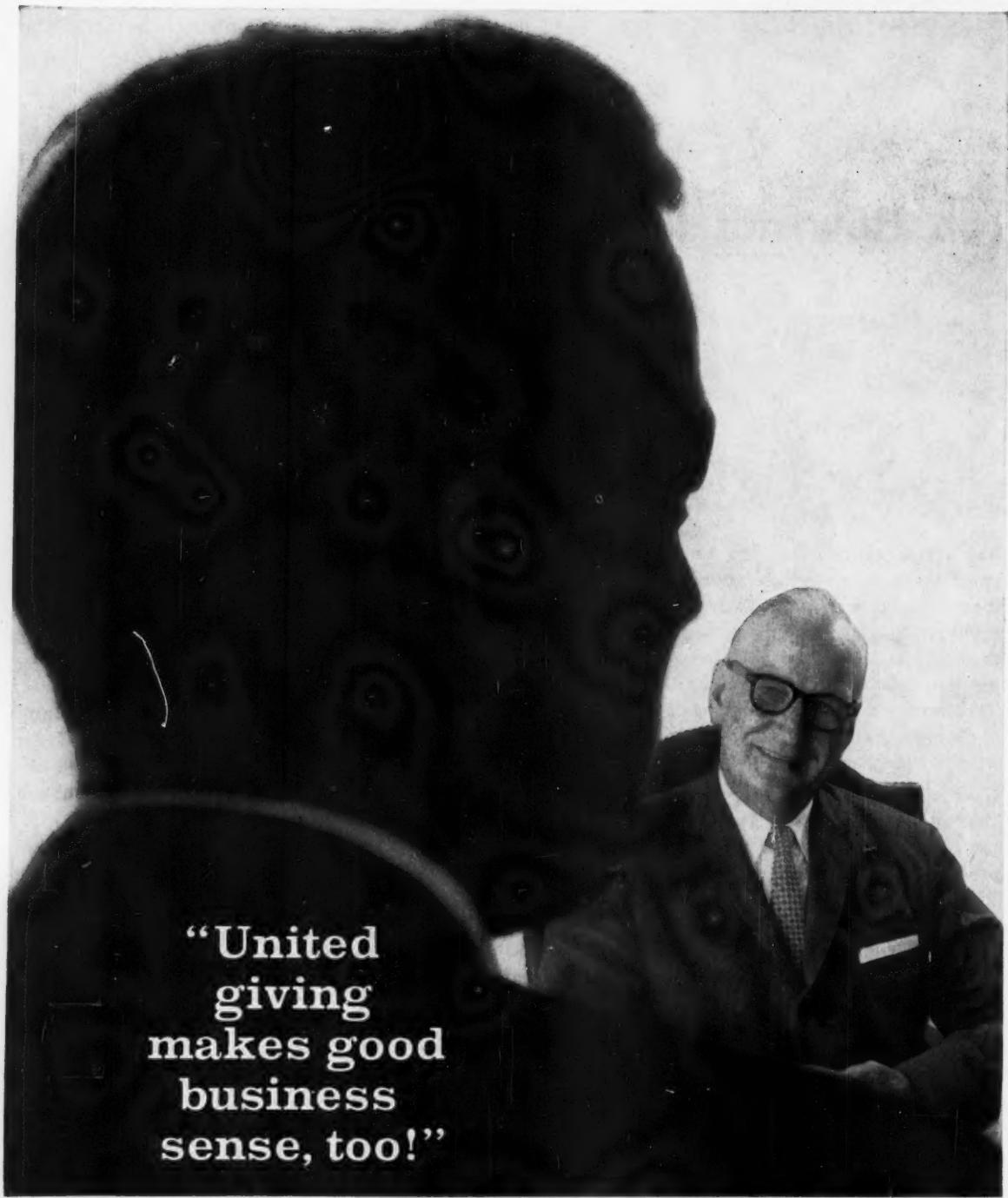


This mark tells you a product is made of modern, dependable Steel.

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company

United States Steel



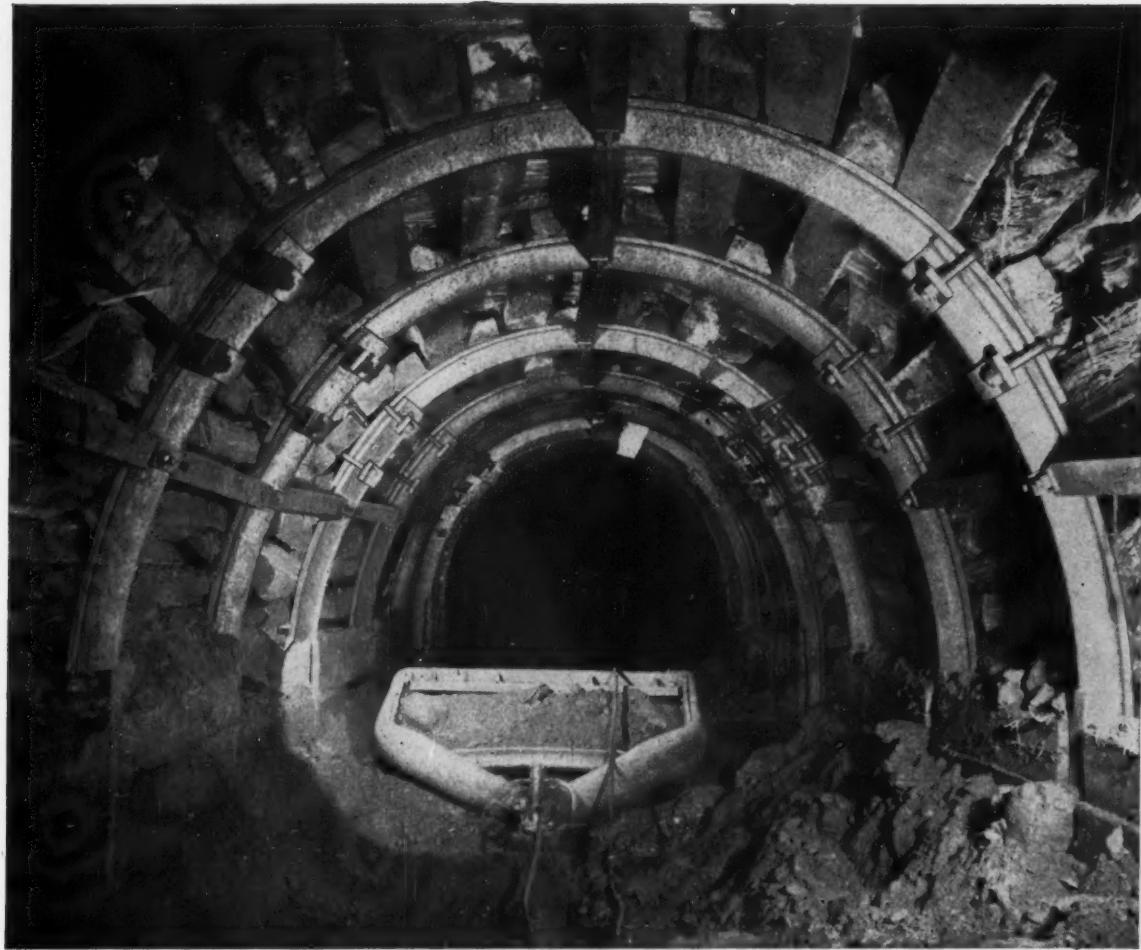


**“United
giving
makes good
business
sense, too!”**

Every business has a vital stake in the welfare of its community. The businesslike way to protect these interests is to support your community The United Way. Your United Fund or Community Chest Campaign takes care of many community needs without the confusion and waste of separate appeals.

Your company can contribute in *three* important ways! ■ Make sure your company makes a generous corporate contribution. It helps protect the welfare of your employees and customers. ■ Help your employees meet their obligations through easy payroll payments. Experience shows this often doubles, even triples, results. ■ Stimulate executive participation in support of your local fund. Such participation helps safeguard the dollar investment made by your company and its employees.

Remember, giving The United Way helps your community *and* your company. **GIVE THE UNITED WAY**



Yieldable Arches GIVE when the "squeeze" is on

Heavy or shifting ground around a mine opening always needs some form of support, to give the overburden a chance to settle naturally into a pressure arch. Mining men have found that the best type of support is one which will yield slowly to the pressures until the natural arch is formed; rigid sets simply cannot stand up under the squeeze of the dynamic forces.

HOLDS FAST UNDER NORMAL LOADS

Bethlehem's Yieldable Arch works on a principle of sliding joints, which are formed by the lapping of one U-shaped segmental steel section over another as shown in the illus-

tration. Husky U-bolt clamps are installed in pairs over the lapped joints, and drawn up tightly enough to hold fast under normal loads. As pressures bear down, however, the arch yields, a little at a time.

PRESERVES MINE SAFETY

The more the Yieldable Arch "gives," the more the stress is transferred to the surrounding material. Eventually, equilibrium is reached and the Yieldable Arch stands pat, its structural integrity maintained and mine safety preserved. That is why you will hear it said that the yielding feature of the Arch is more important than its physical strength.

The Yieldable Arch can only be highlighted here, of course; there is much more you will want to know. Its ease of installation, for example, and its high degree of recoverability. You'll be interested too, in knowing, that many Yieldable Arch installations have paid for themselves in months! A Bethlehem engineer will gladly discuss the full story in terms of your own special problems. Just write to the address below.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

Export Sales: Bethlehem Steel Export Corporation

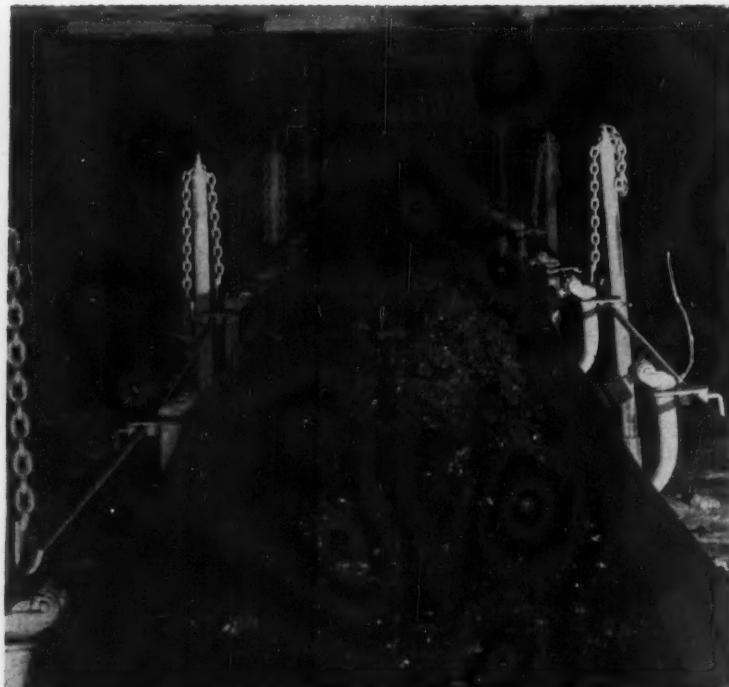
BETHLEHEM STEEL





APPLICATIONS of PVC belting include this thin belt on an extensible unit.

Field Experience With Solid-Carcass PVC Belting



SOLID-CARCASS BELT offers long life at high speed on a ropeframe unit.

Users report that solid-carbon belting offers long life, high resistance to wear and tear, oil-, mildew- and water resistance, easier splicing, good training ability and negligible stretch.

The pioneer PVC belt installations in coal mines of U. S. go back to 1953 when three types of British-developed belting, each of which had proved effective in mines over there, were introduced. The types were cotton-rayon, rayon-nylon, and all nylon. Results varied in these trials because mining conditions were vastly different. Neither of the first two quite came up to expectations in initial trials, but the all-nylon type proved that it could stand the gaff, plus providing full flame resistance.



OTHER USES in the field show PVC belting serving as a refuse conveyor (left) and for clean coal in a preparation plant (right)

Over 500,000 ft of this Scandura nylon belt, sold by National Mine Service, exclusive distributor for Scandura, Inc. (formerly Scandinavia Belting Co.) in the mining field, has gone into operation. The earliest test lengths are still in service with almost no exceptions, and some have handled up to a million tons or more. In addition to confirming its fire resistance, which earned it the first U. S. Bureau of Mines approval designation (28-1), this field experience also has highlighted the following among other advantages:

1. Greater strength with less bulk and weight as a result of ply elimination in favor of a solid carcass, plus thinner covers. Among other things, this makes the belt easier to handle in low coal and cuts installation time. The load on the conveyor motor is

reduced accordingly and longer conveyors can be operated without motor overloading. A better coefficient of friction than rubber also is listed by some users as an added benefit, cutting down on belt slippage and jumping.

2. High resistance to wear and tear, with the further advantage that unit-carcass construction cuts the need for attention to covers to a minimum (the belt can continue to operate satisfactorily even when the cover is badly worn or completely off if the carcass has not been damaged). There is no ply separation, and resistance to tearing, slitting and other mechanical damage is high.

3. Oil, water and mildew do not affect the belt.

4. Splicing is easy and carcass construction results in a major in-

crease in holding power for fasteners.

5. Training ability is good and stretch is almost negligible.

Damaged sections must be removed, which might at first glance appear to be a wasteful practice. Users report, however, that with the PVC unit-carcass principle, combined with nylon, damage is not sufficient to make the belt unusable. If the belt should sustain accidental injury it normally would affect only a limited area, making it simple to remove the damaged portion and re-splice the belt without expensive repair.

The solid woven carcass of the belt is composed of rotproof nylon yarn in both warp and weft, interwoven with cotton pile or filler yarns. The lengthwise strands, or warp, are nylon. This provides the main tensile strength of the belt and takes

the load pull. Additional lengthwise strands, known as the binder, are of high-grade cotton. The binder ties the layers of nylon yarn together into a single mass. The crosswise strands, known as the filling or weft, also are nylon. These strands tie the warp and binder together and hold the belt in shape.

The belt is manufactured on high-powered looms and each strand of yarn is subjected to severe stress during the entire process of weaving. The result is a belting having no plies, no stitches, great strength, little stretch and a greater resistance to internal friction. The carcass is completely impregnated with polyvinyl chloride and the sides and edges are covered with a coating of the desired thickness of this highly abrasion-resistant plastic. A specially constructed edge is woven into the belt to withstand the edge wear sometimes encountered in conveyor operation. In addition to basic fire resistance PVC will melt and smother heat build up by friction against the bare fabric.

Basic specifications are as follows:

Thickness, in	1/4 to 1/2
Width, in	6 to 48
Tensile strength	
(warp) lb per in of width	2,500 to 4,500
Tensile strength	
(weft) lb per in of width	1,500 to 2,100
Weight (per sq ft)	1.55 to 3.16
Minimum recommended pulley diameters, in	6 to 12
Operating speeds, fpm	150 to 600
Maximum recommended angle of incline (depending upon type of material), deg	17 to 21
Surface coefficient of friction	0.65
Maximum recommended working tension per in of width, lb	200 to 320
Working temperature range, deg F	-35 to 212
Fastener holding properties, % of belt strength	60 to 80

Note: Range covers data on different carcass and cover thickness.

Some 17,000 ft of 20-in PVC belting has been installed on gathering and mother conveyors since 1955 by one of the first mines to use Scandura. The first 200-ft test section was placed in service in August. Though the thin plastic cover is almost completely gone the section is still in service. Some fuzzing along the edges has been experienced but not the usual edge damage, since there is no edge layer to be torn or worn off.

Handling in the 3 1/2-ft coal is easier as a result of lighter weight and greater flexibility, and "our experience has been that sharp-edged rock and coal falling on the belt does not seem to cause cutting or holing. Tiny marks or superficial abrasions in the cover are about all that occur. There has been no ripping of face or edge of belt by slate, spillage or turning over, though some lengthwise scoring has been observed."

Hook-type splices are employed, and the construction of the carcass, with its interlocking weave and greater resistance to age, deterioration and rotting, is such that almost no trouble has been experienced with splices pulling out. Among other things, this permits extending conveyors considerably beyond the normal 2,000-ft length, when desirable, without danger of the splices failing.

Experience with fouled belts has included instances where the drive pulley has continued to run and worn the cover completely off. There was no flame or toxic fumes. Because of the fire resistance of the PVC belting the mine has been able to eliminate the second row of stoppers previously required to put the conveyor in neutral air, with an obvious saving.

100,000 Ft in Service

Over 100,000 ft of 36- and 30-in PVC belt (about 50% each) is now operated by another of the companies that put in test sections in 1955. The coal at the mine chosen for the test was sharp-cornered and tended to gouge covers and otherwise give belts a rough time. After about a year the edge looked like a shaving brush, but measurements showed a reduction in width of only 1/8 in. This, plus the fact that there was only a moderate amount of

scoring of the cover—no major tears, breaks or gouges—effectively dispelled the general impression of disintegration given by the fuzzing of the edges.

The test section was part of a 2,500-ft long butt belt 30-in wide. This conveyor carried 200,000 tons of material out of the butt where it was installed; and the test length, being the first belt installed in the conveyor when the butt was advanced and the last section to be removed when the butt was retreated, carried more of this tonnage than any other belt in the conveyor. This test section, which is now over 5 yr old, is still in service in another property.

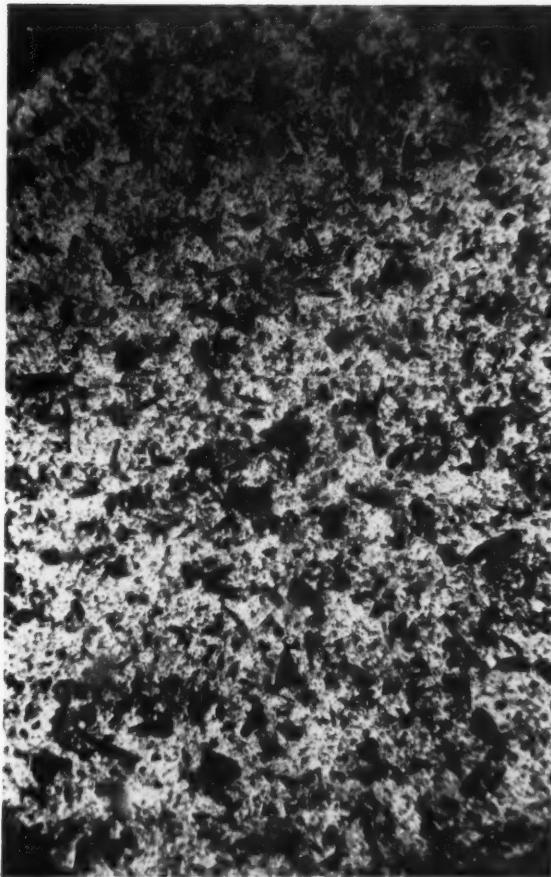
Major conclusions were that the PVC belt is lighter, stronger, easier to handle and resists cutting, gouging, edge wear and other hazards extremely well. Ply separation, due to the nature of the carcass construction, is impossible; the high percentage of nylon in the fabric makes it mildew and rot-proof; and the fastener holding power is far superior to a ply type belt of the same rating.

It was noted that the smooth belt surface resulted in a tendency 'to run out from under the load', particularly at belt speeds of 500 to 550 fpm and when the conveyor was being side loaded. This caused some increase in shuttle car discharge time. However, the delay was very minor and this disadvantage was more than offset by the many advantages obtainable from this belt. No difficulty from load slippage was apparent while the shuttle car discharged over the end of the belt.

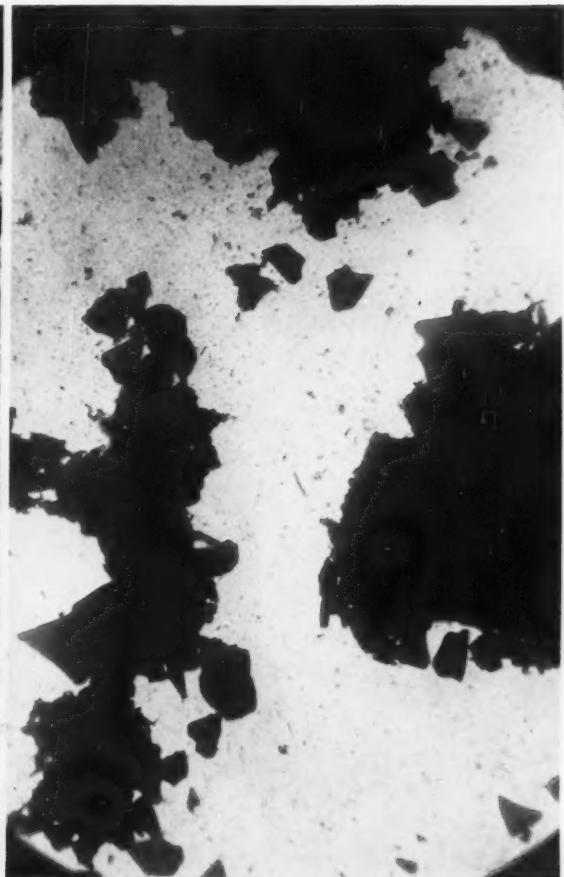
This same organization has recently installed some PVC belting with a new cover compound. Initial reports, based upon two and one-half months of operating experience, indicate the new belt practically eliminates coal slippage even though it is installed in a conveyor being operated at 550 fpm.

Better troughing and longer life are the two main advantages cited for another mine installation. Here the first 200-ft Scandura test section was put in a 30-in conveyor in July, 1956. It is still in service, and the total PVC belt now employed is 8,000 ft of 30-in and 3,000 ft of 36-in—the latter on ropeframe equipment.

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They do not show how little Separan AP30 it takes—0.01 to 0.1 pounds per ton of solids!

They do not show how fast the flocculated fines settle out—30 to 60 feet per hour with as little as 0.02 to 0.04 pounds of Separan AP30 per ton of solids.

They do not show how Separan AP30 helps to keep the investment in equipment, such as thickeners, at a minimum. Thickener efficiency is greatly increased when Separan AP30 is used.

Most of all, they don't show how Separan AP30 has helped many operators keep coal washing costs at

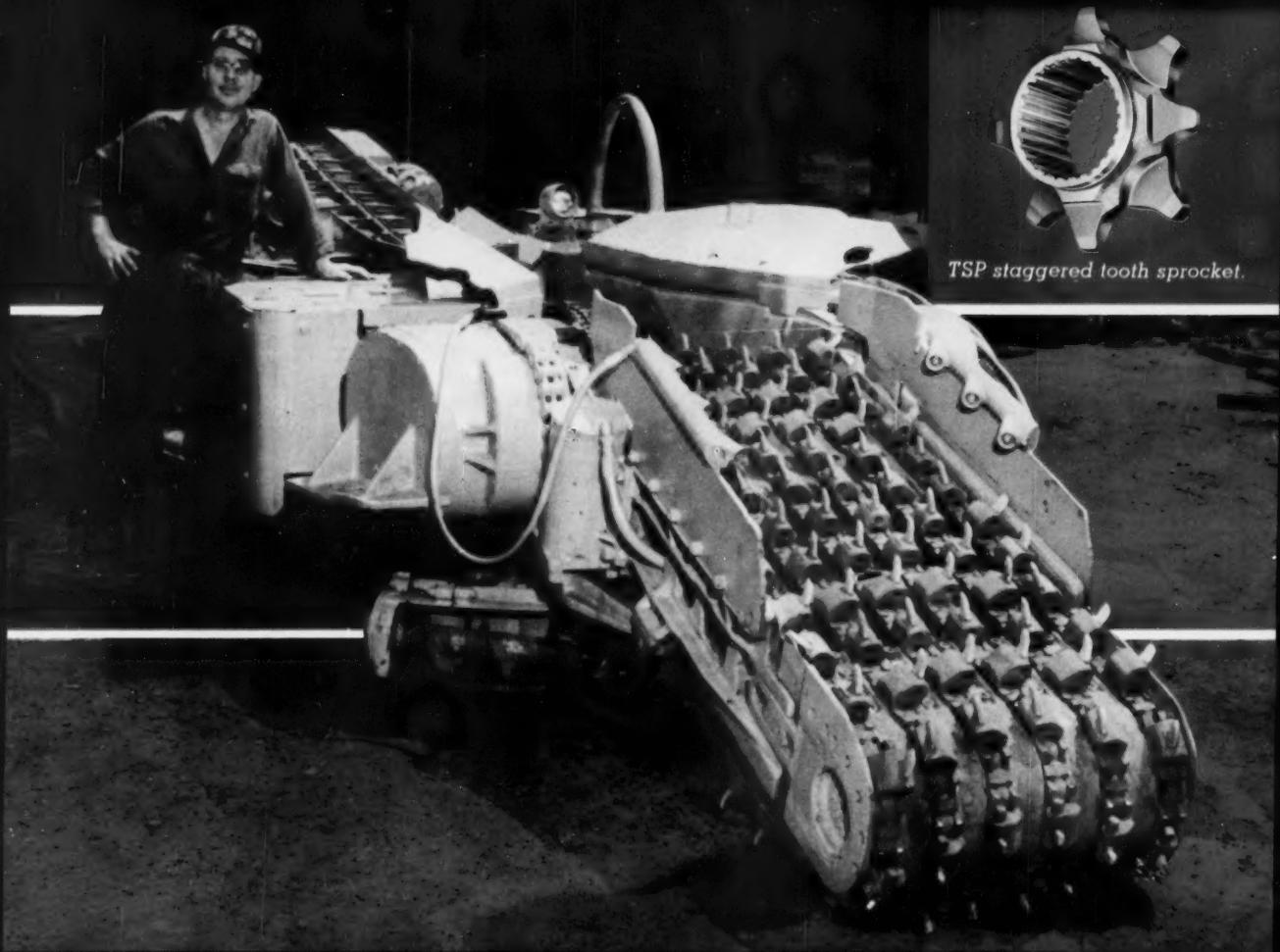
a minimum. In one 18,000-ton-per-day plant, feed water containing about 15 per cent solids goes through three thickeners. Clear-water overflow is maintained in all three thickeners with 0.025 pounds of Separan AP30 per ton of fines. *Cost: \$0.03 per ton.* In a 23,000-ton-per-day plant, 12,000 gallons of water per minute, containing one per cent solids, overflows the primary thickener. Five to seven feet of clear water is maintained in the secondary thickener with 0.013 pounds of Separan AP30 per ton of solids. *Cost: \$0.015 per ton.*

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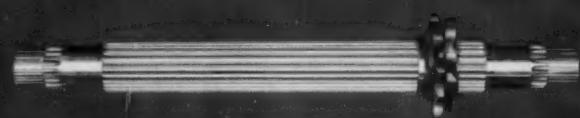
TSP staggered tooth sprocket.

TSP

cuts J & L mine

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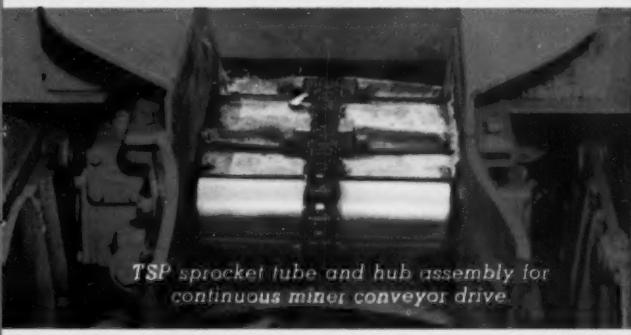
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*TSP splined bore drive shaft,
shown with TSP staggered tooth sprocket, drives
cutting chain on continuous miner.*



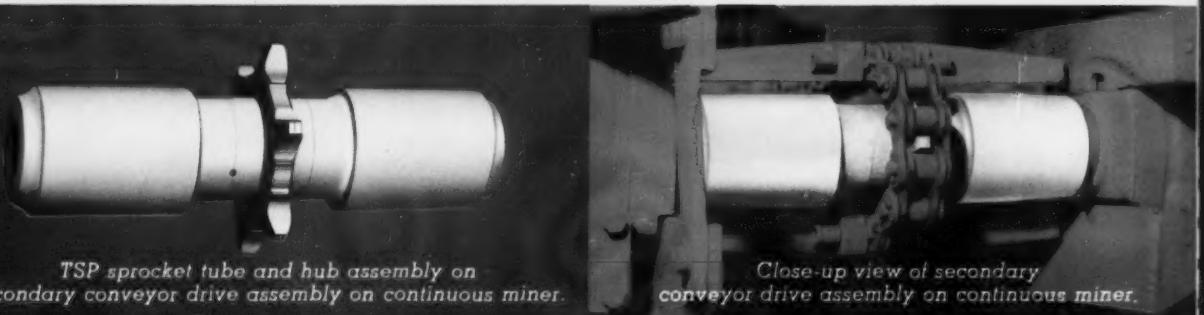
*Close-up of actual
cutting chain on continuous miner.*



*TSP sprocket tube and hub assembly for
continuous miner conveyor drive.*



Primary conveyor on continuous miner.



*TSP sprocket tube and hub assembly on
secondary conveyor drive assembly on continuous miner.*

*Close-up view of secondary
conveyor drive assembly on continuous miner.*

Equipment costs



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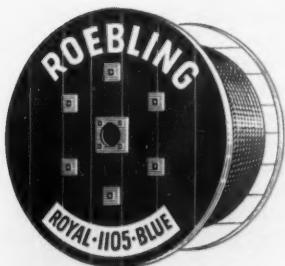
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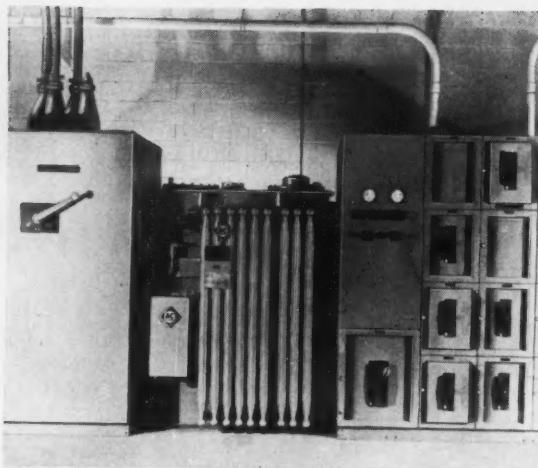
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Application of Switchgear to Coal Operations

RADIAL DISTRIBUTION SYSTEM equipment in this 1,000-kva load-center unit substation supplies 480-V production power. The incoming line section on the left of the transformer contains a fused, three-position selector switch for providing primary selectivity.

R. N. Wilson, Application Engineer, Switchgear Dept., Allis-Chalmers Mfg. Co.

INCREASED USE of the load-center principle of power distribution is in evidence in coal mining and preparation operations, with power at primary voltages transmitted to load center unit substations at or near the load area.

Prior to the development of the load-center distribution system, power was distributed at the utilization voltage from large, centrally-located substations. This led to poor voltage regulation, excessive power losses and unnecessary waste.

While the application of switchgear to coal mining and preparation involves many factors which cannot be adequately covered in a single article, a general survey of modern practices in such distribution systems should be helpful to the plant engineer.

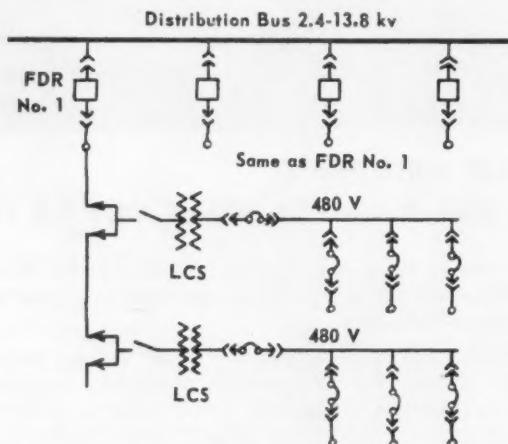


FIG. 1—Radial distribution system (modern).

Most common arrangement is the simple radial system (Fig. 1) which has only one primary feeder and one transformer through which a given secondary bus is supplied. With adequate equipment properly installed, this system is safe, economical, easy to operate and flexible.

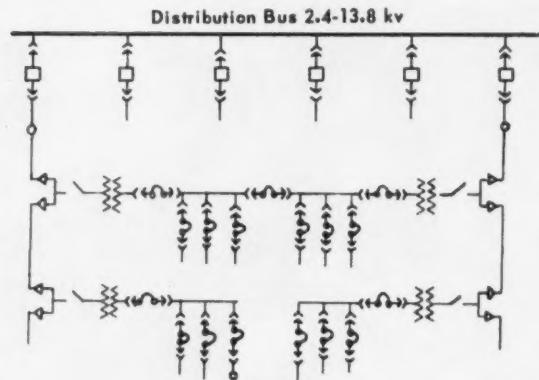


FIG. 2—Secondary selective system.

While the primary cable and nonflammable-liquid-filled transformer in the simple radial system have a high degree of reliability—approximately one failure for every 2,500 transformer years—the chief disadvantage is the complete de-energization of the load area for maintenance. To avoid de-energizing the load area during scheduled shutdowns and to obtain greater flexibility, the simple radial system can be modified with a normal-open tie breaker between pairs of double-ended substations to form a "secondary selective arrangement" (Fig. 2).

During normal operation each substation services its own load area independently, as in a straight radial system. In case of an outage of one primary feeder or transformer, the transformer secondary breaker of the de-energized substation is opened and the tie breaker is closed allowing the energized transformer to feed both load areas.

Since the secondary selective system operates normally as a simple radial, it is safe, easy to operate and uncomplicated as the radial. However, it may be from 5 to 75% costlier, depending upon the reserve transformer capacity required. The straight radial and secondary selective systems are used in about 90% of industrial load-center distribution systems.

The third basic load-center system circuit arrangement is the secondary network (Fig. 3) which is used in only 1 to 2% of industrial distribution systems due to its higher

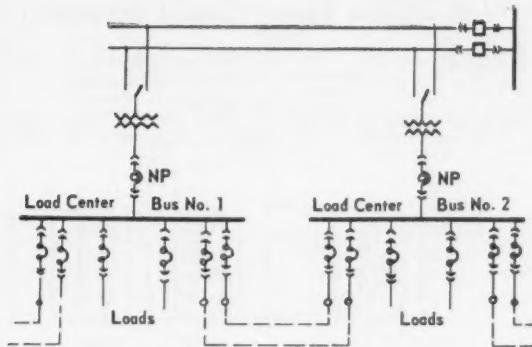


FIG. 3—Secondary network scheme.

cost. However, it does have certain advantages which could justify the larger investment.

This system differs from all others in that all substation transformers are operated in parallel and, in the event of a primary feeder or transformer fault, the faulty circuit is automatically switched off. This system offers the main advantage of allowing large load shifts between substations without appreciably increasing the load on any one transformer.

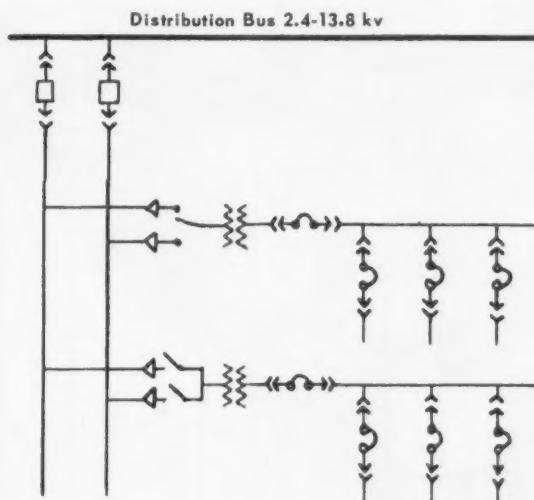


FIG. 4—Primary selective system.

The primary selective system (Fig. 4), fourth basic arrangement, differs from the other three in that two primary feeders are brought to each substation. This system provides service to the load-center substations in event of a primary cable failure. Its use may be desirable where load centers are widely dispersed and primary cables are located in areas where they are subject to damage.

Basic component of the load-center system with secondary voltages of 600 V and below is the load-center unit substation. A load-center substation consists of incoming line, transformer and secondary distribution feeder sections.

The incoming line section may be metal-clad drawout switchgear, a fused or unfused magnetizing current liquid-filled, ventilated dry type or sealed dry type. The

secondary distribution section normally employs metal-enclosed drawout switchgear with large air circuit breakers.

Selection of load-center switchgear must be coordinated with the primary feeder system and the secondary feeder circuits to insure application of breakers with adequate interrupting and continuous current ratings. After the correct breakers are chosen, the number of feeder breakers are selected on the basis of load requirements.

Transformer secondary or main breakers are often used for feeder backup protection, for quick de-energization of all feeders in case of emergency, and for future expansion to transform a radial to a secondary selective system. In some cases, large air circuit breakers are used for motor starting if the starting duty is not repetitive.

Regardless of the load-center circuit arrangement, metal-clad drawout switchgear provides the vital link between the power source and the load-centers. In every primary circuit arrangement it provides short-circuit and overload protection to the primary feeder cables and the load-center transformers.

The basic industrial bus arrangement consists of one source breaker and two or more feeder breakers (Fig. 5). Any other arrangement is used mainly to improve service reliability to all or part of the load during scheduled outages or in the event of source or equipment failure.

FIG. 5—Basic industrial bus arrangement.

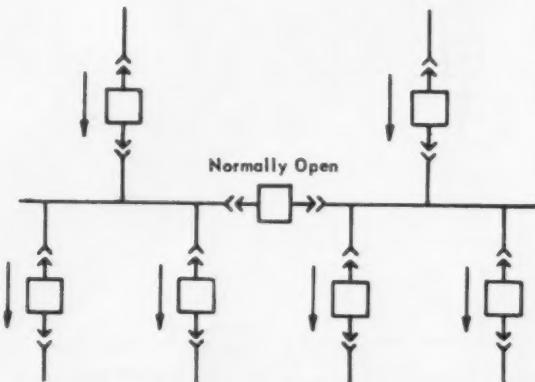
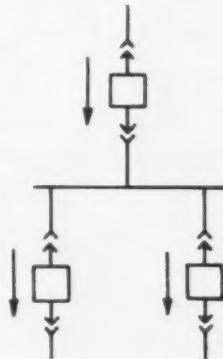


FIG. 6—Two-source sectionalized bus.

A common variation of the basic primary bus arrangement is the two-source, sectionalized bus (Fig. 6). Here the bus tie is operated normally open and each source breaker supplies one half of the bus. If one source fails or is shut down for maintenance, the source breaker is opened and the tie breaker closed, allowing the other source to supply all of the bus. This arrangement is similar to the secondary selective system and is simple, safe, and easy to operate.

An example of how to determine the magnitude of

TABLE I—Ratings for Metal-Clad Equipment With Oil-less Power Circuit Breakers

Item	Interrupting Rating in Mva	Rating in Kv	Minimum Operating Kv at Rated Mva	Continuous Current Rating in Amperes At 60 Cycles	Withstand Test Kv		Momentary Rating in RMS Total Amperes	Interrupting Ratings in RMS Total Amperes For 60-cycle Systems	
					At 60 Cycles (RMS)	Impulse (Crest Value)		At Rated Voltage	Maximum
1	7.5	4.16	3.5	1200	19	60	20000	10400	12500
2	150	4.16	3.5	600	19	60	40000	21000	25000
3	150	4.16	3.5	1200	19	60	40000	21000	25000
4	150	4.16	3.5	2000	19	60	40000	21000	25000
5	250	4.16	3.85	1200	19	60	60000	35000	37500
6	250	4.16	3.85	2000	19	60	60000	35000	37500
7	350	4.16	4	1200	19	60	80000	48600	50000
8	350	4.16	4	3000	19	60	80000	48600	50000
9	250	7.2	4.6	1200	36	95	51000	20000	32000
10	250	7.2	4.6	2000	36	95	51000	20000	32000
11	500	7.2	6.6	1200	36	95	70000	40000	44000
12	500	7.2	6.6	2000	36	95	70000	40000	44000
13	150	13.8	6.6	600	36	95	20000	6300	13000
14	150	13.8	6.6	1200	36	95	20000	6300	13000
15	250	13.8	6.6	1200	36	95	35000	10600	22000
16	250	13.8	6.6	2000	36	95	35000	10600	22000
17	500	13.8	11.5	1200	36	95	40000	21000	25000
18	500	13.8	11.5	2000	36	95	40000	21000	25000
19	500	13.8	11.5	1200	36	95	60000	21000	25000
20	500	13.8	11.5	2000	36	95	60000	21000	25000
21	750	13.8	11.5	1200	36	95	60000	31500	37500
22	750	13.8	11.5	2000	36	95	60000	31500	37500
23	750	13.8	11.5	1200	36	95	80000	31500	37500
24	750	13.8	11.5	2000	36	95	80000	31500	37500
25	1000	13.8	11.5	1200	36	95	80000	42000	50000
				3000					

TABLE II—Short-Circuit Current, at 480 V

Trans- former Rating 3 ϕ KVA & % IZ	Max. Short Circuit KVA Available Primary System	Normal Load Con- tin- uous Amp	Trans- former Alone	300% Motor Load	Com- bined	Recommended AC Breaker Type LA (See Table I for trip coil ratings)			
						M	F	C	S
	50,000		8900	10700					
	100,000		9400	11200					
	150,000		9600	11400					
	250,000		9800	11600					
	500,000		9900	11700					
	Unlimited		10000	11800					
	50,000		13700	16700					
	100,000		15100	18100					
	150,000		15600	18600					
	250,000		16000	19000					
	500,000		16400	19400					
	Unlimited		16800	19800					
	50,000		15500	20000					
	100,000		17300	21800					
	150,000		18100	22600					
	250,000		18700	23200					
	500,000		19200	23700					
	Unlimited		19600	24100					
	50,000		19500	25500					
	100,000		22400	28400					
	150,000		23500	29500					
	250,000		24500	30500					
	500,000		25300	31300					
	Unlimited		26200	32200					
	50,000		25800	34800					
	100,000		31200	40200					
	150,000		33500	42500					
	250,000		35600	44600					
	500,000		37300	46300					
	Unlimited		39400	48400					
	50,000		30900	42900					
	100,000		38200	50200					
	150,000		42600	54600					
	250,000		45900	57900					
	500,000		48700	60700					
	Unlimited		52400	64400					

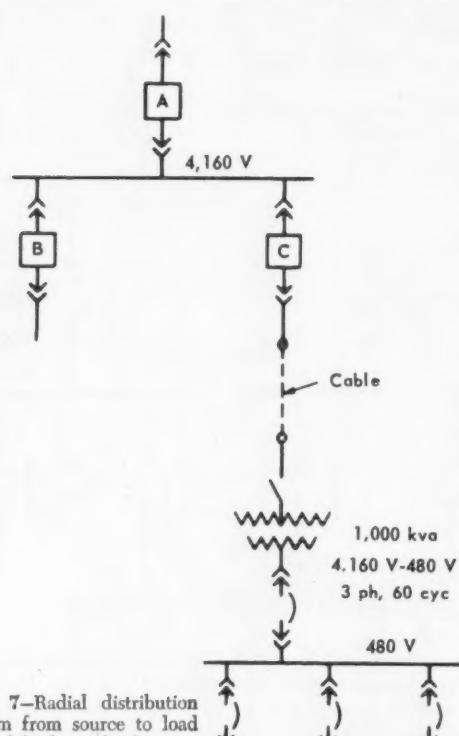


FIG. 7—Radial distribution system from source to load side of feeder in load-center unit substation.

short-circuits is to be found in the single line diagram of a radial distribution system from the source to the load side of a feeder in the load-center unit substation (Fig. 7). In this instance, the power company calculated the

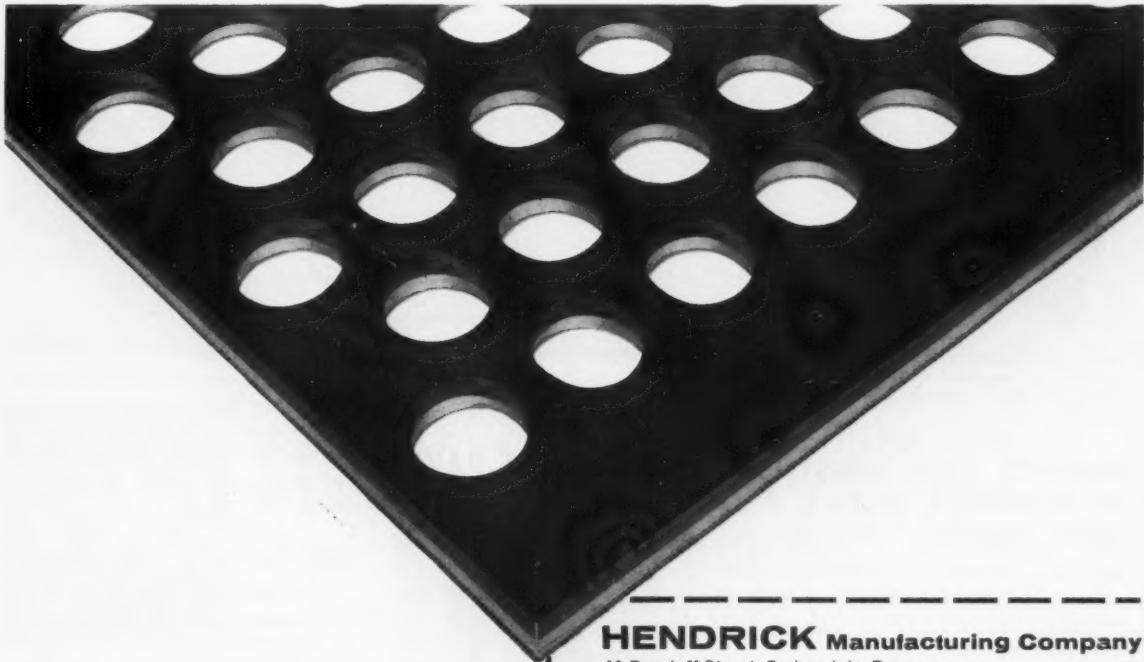
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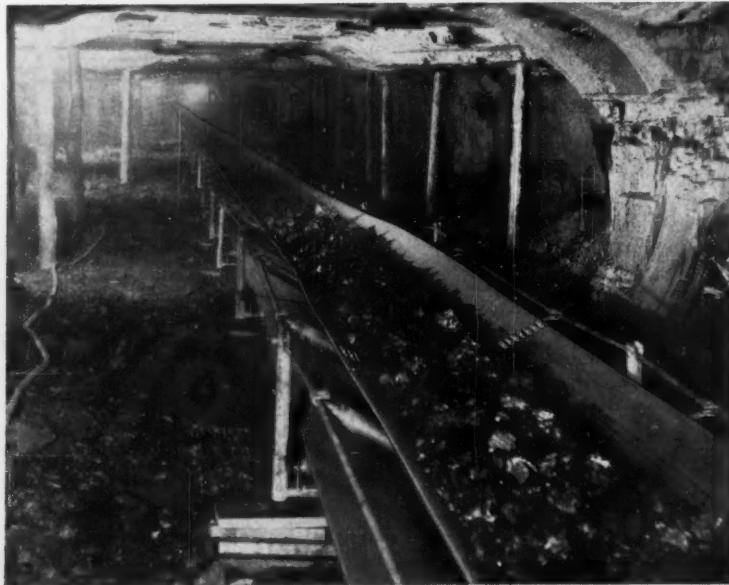
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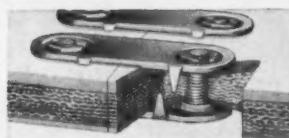
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available short-circuit at the point of entrance to the industrial plant as 100,000 kva. This figure was arrived at by calculating the fault currents available from all of the power company's rotating machines, generators and synchronous condensers and reducing this current in proportion to the amount of impedance between the generators and the industrial plant.

With the interrupting capacity of breakers, A, B, and C determined the proper breaker rating—4,160 V with a 150,000-kva interrupting capacity—is selected from Table I. This breaker will give some reserve capacity in the event the utility's available short circuit should increase with the addition of a new generator or if large synchronous motors are added to the plant's distribution system.

To determine available short-circuit on the 480-V bus, neglect the impedance of the primary cable. By omitting the cable impedance, the available short-circuit at the primary of the 1,000-kva transformer is 100,000 kva.

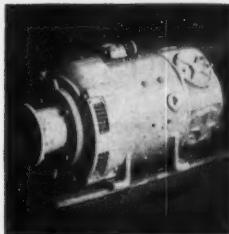
According to Table II, the short-circuit on the 480-V bus is 22,400 amp if no motors are connected to the bus. Motors contribute short-circuit current for a brief period. If it is assumed that there is a 1,000-kva motor load connected to the 480-V bus, the actual short-circuit current available is 28,400 amp. Therefore, the secondary breakers should have a minimum short-circuit capacity of 28,400 amp at 480 V.

It is never wise to select the rating of a circuit breaker without knowing all the facts concerning future expansion of the facilities and future plans of the utility. Sometimes distribution systems grow to a point where the circuit protective devices become inadequate and unsafe.

Next Month in Coal Age

The December issue of *Coal Age* will contain the fourth in the series of "Operating Guides," this one entitled "Belt Conveyors and Belting." The first three Operating Guides were "Mine Storage of Coal," in the December, 1959 issue; "Coal Screens and Screening" in the April, 1960, issue; and "Cutter and Drill Bits" in the September, 1960, issue. Next month's guide will offer down-to-earth evaluations of belt installation, storage of belting, making repairs, maintenance and... a Buyer's Guide. Be sure to see this 16-page special.

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"True, built-in, explosion-proof protection, long-term service and minimum maintenance" are compelling reasons for trusting the machine's power supply to Westinghouse d-c motors. These motors drive hydraulic pumps which actuate hydraulic motors, in turn operating tramming and drilling functions.

The Long-Airbox TDF-10 brings unique mobility to thin seam mines, produces a 9-foot hole in 20 seconds, enables one man to perform both drilling and shooting. Mr. Robert Nelson, vice president, states that the Westinghouse motors, upon which much of the performance of the TDF-10 relies, have established an

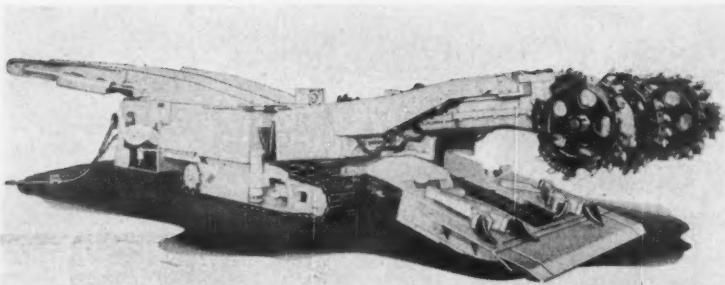
impressive record in the face of one of the industry's most demanding chores.

You can be sure . . . if it's Westinghouse.
**Irv Rowe, Charleston, West Virginia, Sales Office*

J-22164

Westinghouse





LEE-NORSE "CM-38X" miner.

The Bluefield Coal Show

THE 15TH EDITION of the Southern Appalachian Industrial Exhibit offered another successful display of coal-mining equipment at Bluefield, W. Va., Sept. 21-23. Exhibitors and the products they offered included the following:

Loading Machines

Goodman Mfg. Co., Chicago, Ill.—Descriptions of full line of Goodman loading machines.

Jeffrey Mfg. Co., Columbus, Ohio—Series-parallel starter for 81-C loader.

Joy Mfg. Co., Pittsburgh, Pa.—Genuine parts for Joy loaders, including conveyor chain.

Long-Airdox Division of Marmon-Herrington Co., Inc., Oak Hill, W. Va.—NEW Loading machine, Model 188-3, featuring loading rate up to 12 tpm and heights from 23½ in and up.

Continuous Miners

Goodman Mfg. Co., Chicago—Goodman Borer information.

Jeffrey Mfg. Co., Columbus—Colmol studies and applications.

Joy Mfg. Co., Pittsburgh—Descriptions of JCM's and parts, including quick-change bit blocks.

Lee-Norse Co., Charleroi, Pa.—NEW CM-38X miner for cutting heights ranging from 38 in to 7 ft 10 in, with Rap-Lok bit blocks (no set screws).

Wilcox Mfg. Co., Raleigh, W. Va.—Wilcox Miner with extensible chain-conveyor transportation.

Face Preparation, Cutter & Drill Bits, Coal Breaking

Acme Machinery Co., Huntington, W. Va.—NEW LeRoi dust-collecting system and Model H-10 drills mounted on Acme's standard self-propelled compressor for twin-boom horizontal drilling.

Allegheny Ludlum Steel Corp., Carteret Div., Detroit, Mich.—Full line of cutter and drill bits including new designs for quick-change bit blocks.

Black & Decker Mfg. Co., Towson, Md.—Handheld coal drills.

Chicago Pneumatic Tool Co., New York, N. Y.—Coal drills and drill steel.

Duquesne Mine Supply Co., Pittsburgh, Pa.—"REDIPT" parts for cutting chains.

E&E Mine Service Co., Christopher, Ill.—Carbide-tipped bits for cutting and drilling.

Fairview Bit Co., Fairview, W. Va.—

Automatic machines for grinding multiple bits including carbide-tipped.

Galis Electric & Machine Co., Morgantown, W. Va.—Galis self propelled, heavy duty coal drills.

Hercules Powder Co., Wilmington, Del.—Full line of blasting agents and detonators, including "NEW" aluminum-shell blasting caps to provide greater corrosion resistance and higher visibility.

Kennametal, Inc., Bedford, Pa.—Kennametal's complete line of carbide-tipped cutting and drilling bits.

Kersey Mfg. Co., Inc., Bluefield, Va.—Self propelled rubber-tired low vein cutting machine.

Long-Airdox Co., Div. of Marmon-Herrington Co., Inc., Oak Hill, W. Va.—Long-Airdox hydraulic drills, auger sections and multiple shooting with Airdox.

Marathon Coal Bit Co., Inc., Montgomery, W. Va.—Carboly bits, drill rods and bit changing tools.

Metallurgical Products Dept., General Electric Co., Detroit, Mich.—Full line of Carboly cutting and drilling bits.

National Mine Service Co., Pittsburgh, Pa.—Kennametal bits of all types, and Perma-Seal and Quick-Seal tamping plugs.

Vascloy-Ramet Corp., Waukegan, Ill.—V-R bits for coal mining.

Auger Mining

Compton, Inc. (Joy Mfg. Co.), Clarksburg, W. Va.—Compton coal augers.

Long-Airdox Co., Div. of Marmon-Herrington Co., Inc., Chicago, Ill.—Cardox augers for strip or underground augering.

Rish Equipment Co., Bluefield, W. Va.—McCarthy coal recovery drills.

Salem Tool Co., Salem, Ohio—McCarthy drills.

Roof Control

Bethlehem Steel Co., Inc., Bethlehem, Pa.—Roof bolts and yielding steel arches for underground roof support.

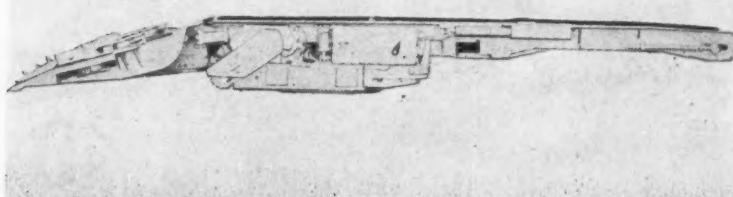
Chicago Pneumatic Tool Co., New York, N. Y.—"NEW" self propelled roof bolting unit, Model RBD-30SD-579, with augermatic through-the-auger dust collection system; overall height 28 in, width 41½ in, trammimg speed 1½ mph.

Connors Steel Div., H. K. Porter Co., Huntington, W. Va.—Preassembled West Virginia roof bolts with improved expansion shells, and table hooks for roof bolt plates.

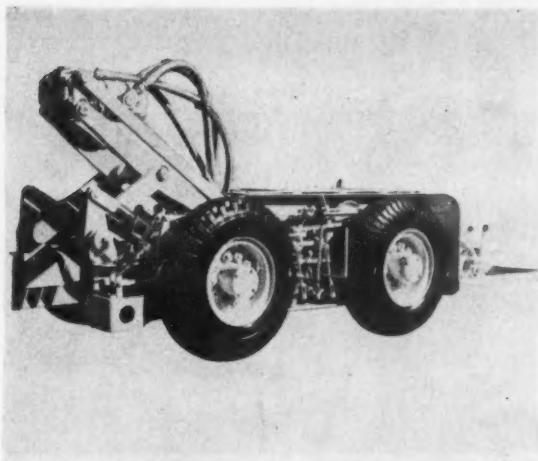
Ingersoll-Rand Co., New York, N. Y.—Stopers, Carset bits and impact wrenches.

Le Roi Div., Westinghouse Air Brake Co., Cleveland, Ohio—Stopers, dust collecting systems, pneumatic drills, drill steel and bits.

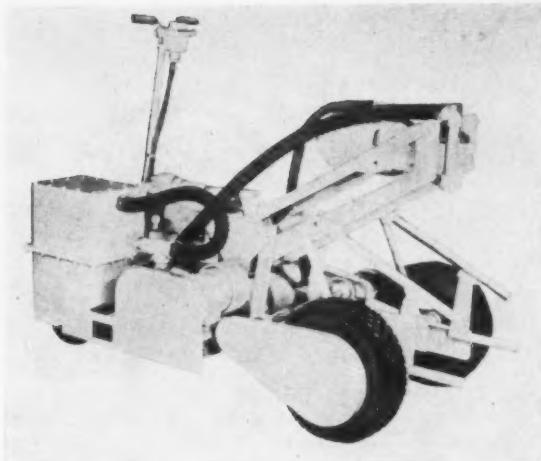
Long-Airdox Co., Div. of Marmon-Herrington Co., Inc., Oak Hill, W. Va.—"NEW" variable speed roof drill with



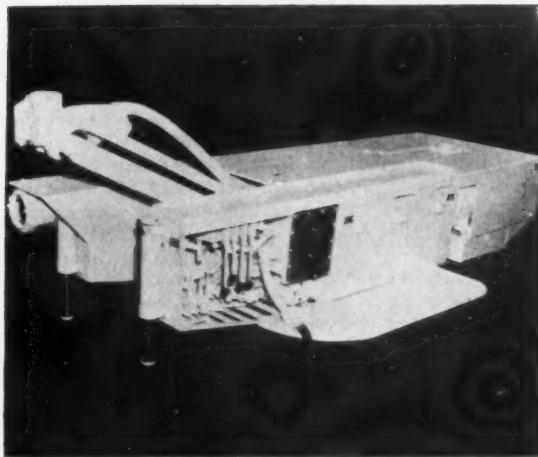
LONG "188-3" loader.



PERSINGER "TRAM-BOLTER."



CHICAGO-PNEUMATIC roof-bolting unit.



LONG-AIRDOX "MODEL LRB" roof-bolting machine.



DANIELS "HYDRAULIC DOOR."

3,000 lb lift; 40 in wide, 27 in high, with provisions for simultaneous roof and face drilling.

Metallurgical Products Dept., General Electric Co., Detroit, Mich. — Carboloy roof bits.

Pattin Mfg. Co., Marietta, Ohio — Pattin mine roof bolts, both wedge and expansion shell types and Pattin air sealer for cementing expansion shells in bolt holes.

Persinger Supply Co., Williamson, W. Va. — NEW, Model SPHRD-1 Tram-Bolter, a self-propelled, 27-in-high roof-bolting machine with hydraulic drive.

Republic Steel Corp., Cleveland — Roof-bolt assemblies.

Schroeder Brothers Corp., Pittsburgh, Pa. — Roof Cat bolting machine with dust collectors and hydraulic Spindicators.

Templeton, Kenly & Co., Broadview, Ill. — Roof and timber jacks.

Coal Preparation

Ashland Oil & Refining Co., Ashland,

Ky. — Permatreat processing spray oil. **Barrett, Haentjens & Co., Hazleton, Pa.** — Vertical solids handling pumps, magnetite and heavy media pumps and high head refuse pumps.

Bixby-Zimmer Engineering Co., Galesburg, Ill. — Loop Rod and Iso Rod screen deck materials; Grizzly Rod and other Bee Zee products.

Bristol Steel & Iron Works, Bristol, Va. — NEW Bristol Bin, a portable steel bin with double discharge gates and provisions for adding side panels to the desired capacity.

Centralia Petroleum Co., Centralia, Ill. — Oil-treatment systems.

Centrifugal & Mechanical Industries, Inc., St. Louis, Mo. — Continuous centrifugal coal driers.

Cross Perforated Metals Plant, National Standard Co., Carbondale, Pa. — Full line of standard screen services plus Conidure pierced metal sheet.

The Daniels Co., Bluefield, W. Va. — DMS coal washing system and NEW

Daniels hydraulic door for controlling flow in coal-cleaning vessels.

Denver Equipment Co., Denver, Colo. — Froth flotation cells and reagent feeders.

Duquesne Mine Supply Co., Pittsburgh, Pa. — Chain for car retarders.

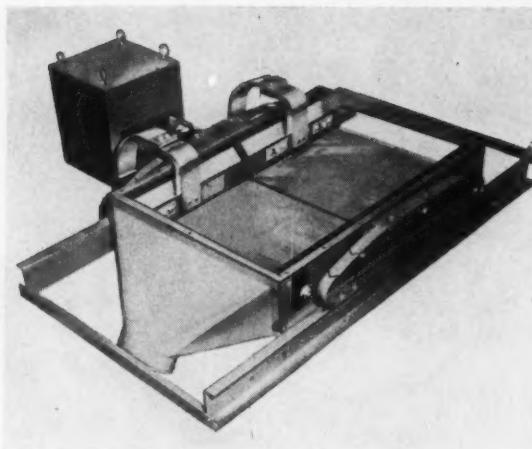
Fuel Process Co., South Charleston, W. Va. — Belknap calcium chloride coal washing system.

Guyan Machinery Co., Logan, W. Va. — WEMCO solids handling pumps.

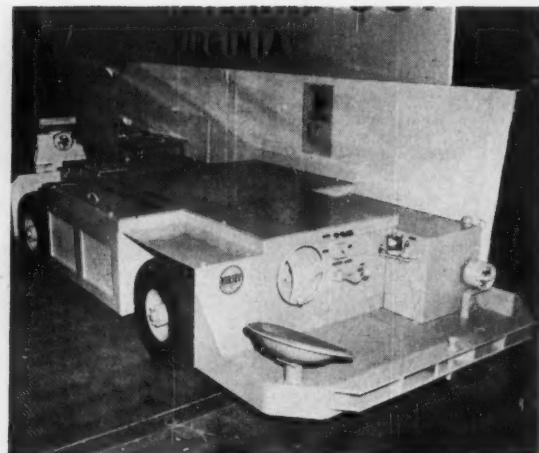
Hendrick Mfg. Co., Carbondale, Pa. — Perforated plate for screening, Wedge-Slot screens and steel flooring. Also, rubber covered perforated plate for coal screens.

Keenan Oil Co., Cincinnati, Ohio — Keenan products including Keenoil No. 7 for oil spray systems in dustproofing and freezeproofing coal.

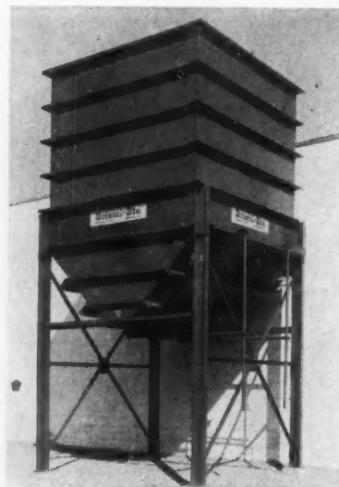
Lecco Machinery & Engineering Co., Bluefield, W. Va. — Lecco-Vib vibrating screen and NEW Converta-Screen, a screen heating system which can be ap-



LECCO "CONVERTA-SCREEN."



KERSEY "D-8" diesel haulage unit.



BRISTOL STEEL'S "BRISTOL BIN."

plied to existing screens in the industry.

Marshall Equipment Co., Inc., Huntington, W. Va.—Gundlach adjustable crusher.

McLanahan & Stone Corp., Hollidaysburg, Pa.—Triple-roll coal crusher.

B. Preiser Co., Inc., Charleston, W. Va.—Full line of laboratory equipment and supplies including a new mixing wheel for preparing multiple samples and a new apparatus for the rapid determination of sulfur.

Rish Equipment Co., Bluefield, W. Va.—Barber-Greene portable conveyors.

Roberts & Schaefer Co., Div. of Thompson-Starrett Co., Inc., Chicago, Ill.—Dense medium cyclone washing systems and other preparation equipment and services.

Stripping

Ray C. Call, Inc., Charleston, W. Va.—Koehring shovels.

Chicago Pneumatic Tool Co., New York, N. Y.—NEW REICHdrill Model 950, a rotary overburden drill with automatic handling of drill steel sections for drilling 12½-in blastholes.

Hercules Powder Co., Wilmington, Del.—Dynatex blasting agent, Hercules Gelamite, blasting caps and detonators and V.A.O. testing meters.

Long-Airdox Co., Div. of Marmon-Herrington Co., Inc., Chicago, Ill.—Roller cone bits and overburden drilling.

Rish Equipment Co., Bluefield, W. Va.—Overburden drills, earthmoving machines including bulldozers, Austin-Western graders and Hough payloaders.

West Virginia Tractor & Equipment Co., Charleston, W. Va.—Michigan earthmoving machines and other strip mine equipment.

Mine Cars, Shuttle Cars, Mine Locomotives, Utility Cars, Personnel Carriers

Bluefield Supply Co., Bluefield, W. Va.—General Electric locomotives.

Enterprise Wheel & Car Corp., Bristol, Va.—Mine cars.

Galax Electric & Machine Co., Morgantown, W. Va.—Covered mantrip cars.

Goodman Mfg. Co., Chicago, Ill.—Mine locomotives and shuttle cars; permissible sealed-beam locomotive headlight.

Jeffrey Mfg. Co., Columbus, Ohio—Jeffrey locomotives and shuttle cars.

Joy Mfg. Co., Pittsburgh, Pa.—Joy shuttle cars.

Kersey Mfg. Co., Inc., Bluefield, Va.—Line of battery-powered tractors and tandem coal cars, plus covered man cars. NEW Model D8 diesel-powered, hydraulic-transmission, rubber-tired tractor.

Long-Airdox Co., Div. of Marmon-Herrington Co., Inc., Oak Hill, W. Va.

—Model 3510-A battery-powered, rubber-tired tractor for heavy duty mantrip and supply hauls. The Inspector's Friend, battery-powered personnel carrier.

Motor Exchange and Supply Co., Hines, W. Va.—Daily's Shutlkars.

National Mine Service Co., Pittsburgh, Pa.—AC and DC Torkar shuttle cars and Greensburg Monitor storage battery locomotives.

S & S Machinery Co., Cedar Bluff, Va.—Models 90 and 80 battery-powered tractors. Model E4 end-dump tandem trailers, 3-wheel mine cars and Model 818G tractor.

Sanford Day Iron Works, Inc., Knoxville, Tenn.—Automatic dropbottom mine cars, Willson automatic couplers and cast steel wheels.

Wise Mfg. & Equipment Co., Inc., Wise, Va.—Model S4S4 mine tractor.

Feeders, Hoists, Dumps and Track

Bethlehem Steel Co., Bethlehem, Pa.—Prefabricated mine track.

Columbus McKinnon Chain Corp., No. Tonawanda, N. Y.—Ratio feeder for transfer of coal from shuttle cars to mainline transportation.

Connors Steel Div., H. K. Porter Co., Huntington, W. Va.—Trackwork.

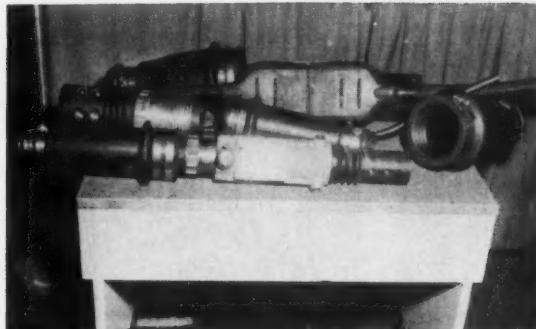
Sanford Day Iron Works, Inc., Knoxville, Tenn.—Power hoists and retarders.

Schroeder Brothers Corp., Pittsburgh, Pa.—Stamler car spotters.

Mine Conveyors, Belts, Accessories

Bearings, Inc., Charleston, W. Va.—B&B conveyor rollers.

Boston Woven Hose & Rubber Co., Pittsburgh, Pa.—Boston Flameout conveyor belts and Dulton covers to resist damage in service.



NATIONAL MINE SERVICE cable connector (600 V).



NATIONAL MINE SERVICE cable connector.

Ensign Electric & Mfg. Co., Huntington, W. Va.—Centrifugal switches including a return idler type, and a belt starting control cabinet with automatic controls for preventing rollback or runaway. NEW improved Interlock for electrical contactors.

Flexible Steel Lacing Co., Chicago, Ill.—Flexco belt fasteners, including the recently developed recessed type; Rema vulcanizing repair kits and other conveyor and V-belt fasteners.

General Splice Corp., Beckley, W. Va.—Minet hinged belt splices and pulley lagging.

Goodman Mfg. Co., Chicago, Ill.—Ropeframe belt conveyors and Goodman belt idlers.

B. F. Goodrich Co., Akron, Ohio—Conveyor belt.

Goodyear Tire & Rubber Co., Akron, Ohio—Goodyear conveyor belting.

Hewitt-Robins Incorporated, Stamford, Conn.—Rope Stringer extensible belt conveyor and Hammock idlers.

Long-Airdox Co., Div. of Marmon-Herrington Co., Inc., Oak Hill, W. Va.—Lo-Rope belt conveyors for the Long system of mining.

National Mine Service Co., Pittsburgh, Pa.—Scandura Gold Line conveyor belting, belt fastening equipment, including splicing tools.

H. K. Porter Co., Inc., Thermodiv., Philadelphia, Pa.—Thermocoal and Plasticoal (PVC) flame-resistant belts for mine conveying service.

Reid Belt & Rubber Co., Inc., Bluefield, W. Va.—Conveyor belt repair service and pulley lagging.

United States Rubber Co., New York, N. Y.—Mine-Haul conveyor belt, rubber covered impact idlers and other U. S. rubber idlers.

West Virginia Belt Sales Co., Charleston, W. Va.—Rusco PVC conveyor belting; belt repair services.

Electric Wire, Cable, Bonds, Splices, Ground Detectors

American Steel & Wire Div., U. S. Steel Corp., Pittsburgh, Pa.—Amerclad

mining machine cables and Tiger Brand electrical wire and cable.

Anaconda Wire & Cable Co., New York, N. Y.—Securityflex portable cables and a full line of cables for mine service.

Burndy Corp., Norwalk, Conn.—Terminals, splices and connectors including welded-in-place connections.

Circle Wire & Cable Corp., Maspeth, N. Y.—Electrical wire and cables.

Duquesne Mine Supply Co., Pittsburgh, Pa.—Trolley and feeder supports, sectionalizing switches, fuse trolley taps and cable protectors, plastic utility hooks.

Ensign Electric & Mfg. Co., Huntington, W. Va.—Cable connectors.

General Cable Corp., Bristol, Tenn.—Super Service mine cables with Supertuf jacketing.

Joy Mfg. Co., Pittsburgh, Pa.—Electrical cable connectors, cable vulcanizers and Lectronic Sentry ground protection systems.

Kaiser Aluminum Corp., Oakland, Calif.—Aluminum power cables.

Mosebach Electric & Supply Co., Pittsburgh, Pa.—Trolley and feeder supplies, trolley pole equipment, cable splicers, shock absorbers and rail bonds.

National Mine Service Co., Pittsburgh, Pa.—Cable repair service and NEW 7,500-V multi conductor cable connector. The assembly is made of individual components such as pins and sockets with single conductor pig tail leads. The single conductor leads are air spaced and mechanically held, then spliced onto the incoming cable. The splicing area is then covered by a threaded neoprene boot requiring no sealing compound. Manufactured by Brad Harrison Co., Hillside, Ill. and distributed by National Mine Service Co. Also, 600-V class of connectors, coupling type, adaptable to the usual types of mining cables, Federal Approval 21222.

Okonite Co., Passaic, N. J.—Insulated cables, tapes and cable repair materials and mining machine cables.

Plastic Wire & Cable Corp., Jewett City, Conn.—Plastic-Jacketed wire and trailing cables.

H. K. Porter Co., Inc., National Electric Div., Pittsburgh, Pa.—Electrical wire and cable.

Rome Cable Div., Aluminum Corp. of America, Rome, N. Y.—Mining cables.

Williamson Supply Co., Pineville, W. Va.; **Banks-Miller Supply Co.**, Huntington, W. Va.; and **W. S. Bolden, Inc.**, Simplex wire and cable.

Safety Products, Mine Lighting, Communication

Duquesne Mine Supply Co., Pittsburgh, Pa.—Car skids of wear-resisting metal; REDIPT S Car Hold and Tru Ring inspectors' roof pick.

Femco, Inc., Irwin, Pa.—Transistorized loud speaking telephones, circuit scanners for fan signals and circuit breaker controls and other industrial communications systems.

General Electric Co., Industrial Electronics Div., Lynchburg, Va.—Transistorized Progress line of communications equipment including mobile radio.

Guyan Machinery Co., Logan, W. Va.—Visigard trolley wire shielding metals.

Mine Safety Appliances Co., Pittsburgh, Pa.—Recently developed airslide rock dust distributor, closed circuit television, Mine Phones and other communications equipment, personnel safety clothing and equipment, oxygen breathing apparatus, methane detector, Velocity Power stud driver. NEW Thru-Steel dust collecting system for roof drills.

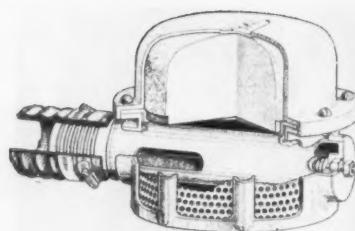
National Mine Service Co., Pittsburgh, Pa.—Wheat cap lamps and chargers, flame safety lamps, methane detectors, safety hats, goggles.

Compressors, Drills, Steel, Bits

Acme Machinery Co., Williamson, W. Va.—Stationary compressors; self-propelled compressors with 4-wheel drive; stoppers and stopper arms and Le Roi dust collectors.

Allegheny Ludlum Steel Corp., Brackenridge, Pa.—Carmet bits for mining.

Chicago Pneumatic Tool Co., New



MEGATOR "DOLPHIN" floating suction strainer.

York, N. Y.—Three-cone rock bits for overburden drilling.

Metallurgical Products Dept., General Electric Co., Detroit, Mich.—Carboloy roof and coal bits, and enclosed-cylinder-tipped machine bits.

Kennametal, Inc., Bedford, Pa.—Rotary drilling augers including a jointed model; full line of coal and roof bits.

Le Roi Div., Westinghouse Air Brake Co., Cleveland, Ohio.—Air drills and stopers, air legs, bits.

Marathon Coal Bit Co., Montgomery, W. Va.—Full line of Carboloy bits and Marathon throwaway bits; bit changing tools.

Rish Equipment Co., Bluefield, W. Va.—Ingersoll-Rand gyroflow compressors.

Schroeder Brothers Corp., Pittsburgh, Pa.—Air compressors.

Timken Roller Bearing Co., Canton, Ohio.—Timken tapered rock bits and carbide insert tips.

Vascoloy-Ramet Corp., Waukegan, Ill.—V-R cutter and drill bits.

West Virginia Tractor and Equipment Co., Charleston, W. Va.—Gardner-Denver compressors, drills, stopers and impact wrenches.

Pumping and Drainage

Barrett, Haentjens & Co., Hazleton, Pa.—Permissible gathering pumps and accessories such as check valves, strainers.

Carlton Products Corp., Cleveland, Ohio.—Carlton plastic pipe, flexible and rigid.

Chicago Pneumatic Tool Co., New York, N. Y.—Sump pumps.

Ensign Electric & Mfg. Co., Huntington, W. Va.—Flygt submersible pumps.

B. F. Goodrich Co., Akron, Ohio.—Hose.

Goodyear Tire & Rubber Co., Akron, Ohio.—Hose.

Gorman-Rupp Co., Mansfield, Ohio.—Centrifugal mine pumps.

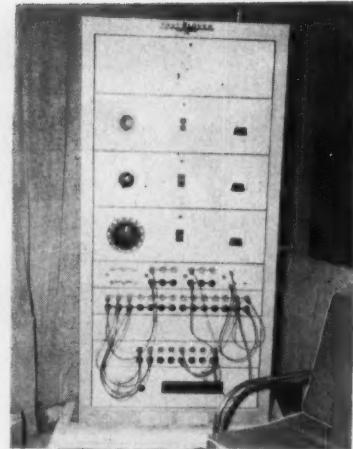
Goyne Pump Co., Ashland, Pa.—Mine pumps and silt pumps.

Guyan Machinery Co., Logan, W. Va.—Foot valves and strainers.

Megator Corp., Pittsburgh, Pa.—Corrosion resistant, self lubricating unitized float switch. Conflow autospay control for dust allaying, controlled by con-



PEMCO "SILPAK" rectifier.



POST-GLOVER test unit.

veyor belt motion and load. NEW plastic-shelled Dolphin floating suction strainers to draw intake from just below the surface eliminating intake of air and varying in mud in shallow water.

F. E. Myers & Co., Ashland, Ohio.—Submersible pumps, bulldozers, pumps, self-priming centrifugal pumps.

National Mine Service Co., Pittsburgh, Pa.—Alumiron type couplings and fittings.

Republic Steel Corp., Cleveland, Ohio.—Plastic pipe.

Joseph T. Ryerson & Son, Inc., Cincinnati, Ohio.—Ryertex plastic pipe.

Schroeder Brothers Corp., Pittsburgh, Pa.—Megator pumps.

United States Rubber Co., New York, N. Y.—Hose and fittings, including rubber pinch valve hose; rubber and plastic pipe and fittings.

Victaulic Co. of America, Elizabeth, N. J.—Victaulic couplings and fittings; stainless-steel and PVC lined fittings; Vic Groover tools.

Ventilation

American Brattice Cloth Corp., Warsaw, Ind.—Brattice cloth and ventilation tubing.

Hargis Mine Fly Co., Pineville, W. Va.



BURGESS "BARRICADING KIT."

—Quilted brattice cloth Fly Pad, an improved type check curtain consisting of four layers of brattice cloth, quilted for greater strength when used as checks.

Mine Ventilation Systems, Inc., Madison, W. Va.—Prefabricated Herculite plastic check curtains; Burgess Barricading Kits for emergency use.

Motors & Controls, Transformers, Conversion Units, Batteries

Bluefield Hardware Co., Bluefield, W. Va.—Allis-Chalmers motors and controls.

Counts Automotive Supply Co., Bluefield—Willard batteries and Fox battery chargers.

Ensign Electric Co., Huntington, W. Va.—AC and DC starters, including belt starters with automatic controls; distribution boxes; permissible push buttons; NEW interlock for contactors.

Euclid Electric & Mfg. Co., Madison, Ohio.—Industrial control equipment of all types, including speed-responsive switches, push-button stations, resistors, assembled controllers, resistors, and designing services for special applications of controls.

General Electric Co., Assemblies and Components, Schenectady, N. Y.—Safety switches and circuit breakers.

Gould-National Batteries, Inc., Trenton, N. J.—Kathode industrial batteries and the Silicotic plate used in batteries for mining applications.

Guyan Machinery Co., Logan, W. Va.—Resistors; epoxy insulation; motor coils; wheel-assembly and hydraulic-systems repair services; surge-comparison equipment for motor repair service.

Kersey Mfg. Co., Bluefield, Va.—Exide industrial batteries and battery chargers.

Mine Safety Appliances Co., Pittsburgh, Pa.—Transistorized audio-tone

control systems for monitoring circuit breakers, pumps, generators, fans and so on.

Pemco Corp., Bluefield, W. Va.—NEW Silpak single- or three-phase power rectifiers for mining applications. NEW Phase-Guard phase failure relay with components embedded in epoxy resins for water-resistance.

Post-Glover Electric Co., Covington, Ky.—NEW variable-voltage power-supply for testing electrical equipment in shops; automatic electric convection heaters; chromium-steel grid resistors; transfer switches.

S & S Machinery Co., Cedar Bluff, Va.—Models D-4 and A-6 battery chargers; Gould batteries.

Westinghouse Electric Corp., Pittsburgh, Pa.—Life-Line motors and gears.

Plant Lighting, Lamps

General Electric Co., Lamp Div., Nela Park, Cleveland—Mercury lamps; incandescent reflector lamps; Power-Groove fluorescent lamps.

Mine Safety Appliances Co., Pittsburgh, Pa.—M-S-A fluorescent lighting fixtures for underground applications at the face.

Westinghouse Electric Corp., Pittsburgh, Pa.—Industrial lamps, including Colortone mercury units.

Power Transmission

Bluefield Hardware Co., Bluefield, W. Va.—Allis-Chalmers Tex-Rope drives; Falk speed reducers.

General Electric Co., Apparatus Sales Div., Schenectady, N. Y.—Tri-Clad gearmotors; shaft-mounted speed reducers.

Goodyear Tire & Rubber Co., Akron, Ohio—Compass V-belts; flat transmission belts.

Hart Electric Co., Bluefield, W. Va.—Browning V-drives.

Kersey Mfg. Co., Bluefield, Va.—Speed reducers.

Joseph T. Ryerson & Son, Inc., Cincinnati—Ryertex laminated plastic gears, sprockets.

U. S. Rubber Co., New York—V belts.

Westinghouse Electric Corp., Pittsburgh—Moduline gearmotors.

Williamson Supply Co., Pineville, W. Va.—Diamond roller chains and sprockets; flexible-shaft couplings.

Tractors, Tractor-Loaders,

Bulldozers, Graders

Ray C. Call, Inc., Charleston, W. Va.—Line of tractors and bulldozers.

Carter Machinery Co., Roanoke, Va.—Caterpillar tractors and Traxcavator excavators.

Rish Equipment Co., Bluefield, W. Va.—International tractors; Drott Skid-Shovels; Hough Payloaders.

Trucks, Engines, Torque Converters, Generators

Appalachian Engineering & Equipment Co., Bristol—Car cranes.

Ray C. Call, Inc., Charleston, W. Va.—Trucks; front-end loaders, General Motors diesel engines and generators.

Carter Machinery Co., Roanoke, Va.—Caterpillar diesel-electric sets.

Empire Corp., Milwaukee, Wis.—Electric generator sets.

Ravens Metal Products, Parkersburg, W. Va.—Aluminum truck bodies (*Coal Age*, September 1960, p144.)

Rish Equipment Co., Bluefield, W. Va.—International Harvester trucks; Hough Payloaders; P&H truck cranes.

West Virginia Tractor & Equipment Co., Charleston, W. Va.—Murphy diesel generators.

Bearings

Bearings, Inc., Charleston, W. Va.—SKF, Timken, Fafnir, Rollway, Dodge-Timken, Torrington bearings; Johns-Manville seals; Garlock seals; maintenance tools; Keystone lubricants.

Bearing Service Co., Inc., Pittsburgh—New ball and roller bearings and re-ground bearings.

Bluefield Hardware Co., Bluefield—MRC, Fafnir and Timken bearings.

Coppinger Machinery Service, Bluefield—Federal-Mogul bearings; gears.

Federal-Mogul Bower Bearings, Inc., Richmond, Va.—Full line of bearings, featuring Unitized-Seal types.

Joseph T. Ryerson & Son, Inc., Cincinnati—Laminated plastic bearings.

Timken Roller Bearing Co., Canton, Ohio—Timken tapered roller bearings.

Hydraulics

Cross Sales & Engineering Corp., Greensboro, N. C.—Aeroquip hydraulic hose and fittings.

Eastman Atlantic Mfg. Co., Wilmington, Del.—Hydraulic hose and fittings.

Riggs Engineering Co., Ludlow, Ky.—Nylaflow pressure tubing.

Schroeder Bros., Pittsburgh—Hydra-Luber; automatic shut-off valves; filters and Spindicators; hydraulic-circuit testers.

Stratoflex, Inc., (Tri-State Transmission Co., Bluefield)—Detachable, reusable fittings and flexible hose assemblies.

Weatherhead Co., Ft. Wayne, Ind.—Full line of hose ends and assemblies; hydraulic system tools; industrial hose.

Wire Rope, Steel, Steel Products

American Steel & Wire Div., U. S. Steel Corp., Pittsburgh—Tiger brand wire rope.

Bethlehem Steel Co., Bethlehem, Pa.

—Wire rope, slings and industrial fasteners.

Bluefield Hardware Co., Bluefield, W. Va.—Leschen Red Strand wire rope.

Circle Wire & Cable Corp., Maspeth, N. Y.—Wire ropes.

Duquesne Mine Supply Co., Pittsburgh—Swivels and drop links; screws and bolts.

Jones & Laughlin Steel Corp., Pittsburgh—NEW steel alloys; Warehouse service.

Joseph T. Ryerson & Son, Inc., Cincinnati—Ryerson steels, including stainless and alloy, in bar, shapes, perforated or expanded forms.

Platnick Bros., Bluefield—Design and fabrication of steel structures.

Screw & Bolt Corp. of America, Pittsburgh—Bolts, nuts, screws and other fastening products.

West Virginia Steel Corp., Charleston, W. Va.—Structural steel products, steel grating and treads, translucent panels.

Lubrication

Ashland Oil & Refining Co., Ashland, Ky.—Valvoline and Aorco lubricants.

Esso Standard Oil Co., Bluefield—Esso mining lubricants.

Gulf Oil Corp., Pittsburgh—Mining machine lubricants.

Riggs Engineering Co., Ludlow, Ky.—Lincoln Centromatic lubrication systems.

Shell Oil Co., New York—Fire-resistant fluid; lubricants.

Texaco, Inc., New York—Mining lubricants and engineering service.

New & Renewal Parts

Bearings, Inc., Charleston, W. Va.—Nylon bars and gears.

Coppinger Machinery Service, Bluefield—Replacement parts.

Fairmont Supply Co., Bluefield—Full line of replacement parts; representing over 200 manufacturers of equipment and supplies.

Goodman Mfg. Co., Chicago, Ill.—Genuine Goodman parts, including permissible aluminum headlamp.

Guyan Machinery Co., Logan, W. Va.—Headlamps for mining equipment.

Hart Electric Co., Bluefield—Armature and field coils.

Jeffrey Mfg. Co., Columbus, Ohio—Jeffrey parts.

Joy Mfg. Co., Pittsburgh—Joy replacement parts.

Marathon Coal Bit Co., Montgomery, W. Va.—Mine machinery replacement parts.

Mining Machine Parts, Inc., Cleveland—Replacement parts.

Mosebach Electric & Supply Co., Pittsburgh—Brass bushings.

National Electric Coil Co., Bluefield—National coils for all types of electrical equipment.

National Mine Service Co., Pittsburgh
—Clarkson Red Bird conveyor chain.

Westinghouse Electric Corp., Pittsburgh—Headlamps and other electrical supplies.

West Virginia Armature Co., Bluefield
—Field and armature coils and mechanical parts for mine equipment.

Maintenance, Repair Service

Allegheny-Ludlum Steel Corp., Carmet Div., Brackenridge, Pa.—Industrial tools; metal cutting tools; carbide blanks.

Bearings, Inc., Charleston, W. Va.—OTC tools and pullers.

Black & Decker Co., Towson, Md.—Production and maintenance tools.

Guyan Machinery Co., Logan, W. Va.—Guyan repair service.

Hart Electric Co., Bluefield—Armature and motor repair and rewinding; also General Electric and Delco-Packard products.

Industrial Gas & Supply Co., Bluefield; **Beckley Welding Supply Co., Beckley**; **Erwin Supply Co., McClure, Va.**—Airco welding gases and products.

Ingersoll-Rand Co., New York—I-R power and impact tools.

Mosebach Electric & Supply Co., Pittsburgh—Resistance welders.

National Electric Coil Co., Bluefield—Armature and coil rewinding and rebuilding with a variety of insulations.

National Mine Service Co., Pittsburgh—Rebuilders of mining equipment.

Pocahontas Welding Supply Co., Bluefield—Hobart welding machines and accessories; Bay State bits and abrasives.

Proto Tool Co., Los Angeles, Calif.—Full line of hand tools for machine maintenance.

Post-Glover Electric Co., Covington, Ky.—P-G arc welders and electric heaters.

Rish Equipment Co., Bluefield—Steam cleaners.

Rust-Oleum Corp., Evanston, Ill.—Rust-preventive paints and coatings.

Sherwin-Williams Co., Cleveland—Full line of paints and coatings.

Skil Corp., Chicago—Skil portable tools, including drills and saws.

Superior Sterling Co.—NEW Swench manual impact wrench.

S. K. Wellman, Inc., Bedford, Ohio—Automotive friction products, such as, clutch plates and facings.

Templeton, Kenly & Co., Broadview, Ill.—Re-Mo-Trol and Util-a-Trol tools and pullers.

West Virginia Armature Co., Bluefield—Electrical and mechanical repair.

Mining Specialties, Services

Appalachian Electric Power Co., New York—Coal-by-wire promotion.

Bluefield Supply Co., Bluefield—Distributors of mining supplies.

Citizens Coal & Supply Co., Bluefield—Latex concrete-repair compounds and water sealers.

Bituminous Coal Equipment, Inc., affiliate of National Coal Association, Washington, D. C.—Combustioneer "80" forced warm-air furnace, a completely packaged system, is said to reduce heating costs as much as 40% in a single season. The furnace is automatically through a thermostat.

Coal Age, New York—Publishing services for the coal industry, including those of its affiliates, Keystone Coal Buyers Manual and Coal Mine Directory.

Norfolk & Western Railway Co.—80-ton hopper car; diesel locomotive; 50-ft box car, and traveling safety-car.

Persinger Supply Co., Williamson, W. Va.—Vibrating screens; Dodge couplings; Carbite bits; C-P drills and impact wrenches, and mining supplies.

Superior Sterling Co., Inc., Bluefield—Representing recognized manufacturers of equipment with a full line of mining supplies and equipment.

Virginia Polytechnic Institute, Blacksburg, Va.—Mining engineering education.

West Virginia University, Morgantown, W. Va.—Mining extension services.

How to keep customers happy—all winter long



Treat all shipments with **Sterling Rock Salt**, and your customers will be able to unload coal *fast* even in freezing weather. They won't have to thaw your cars or loosen coal by hand. Customers will gladly pay the small premium for coal that is treated so it won't freeze up! You can apply Sterling Rock Salt quickly, too. Just three or four bags of this effective anti-freeze agent will keep an entire carload of coal from freezing! (It takes only 5 lbs. of Sterling Rock Salt to protect one ton of bituminous; 5-8 lbs. for anthracite.)

You can also use Sterling Rock Salt to prevent frozen scales and switches . . . to keep roads and yards clear throughout the winter. It removes snow and ice *fast*. Comes in bulk carloads or packed in 100-lb. bags.

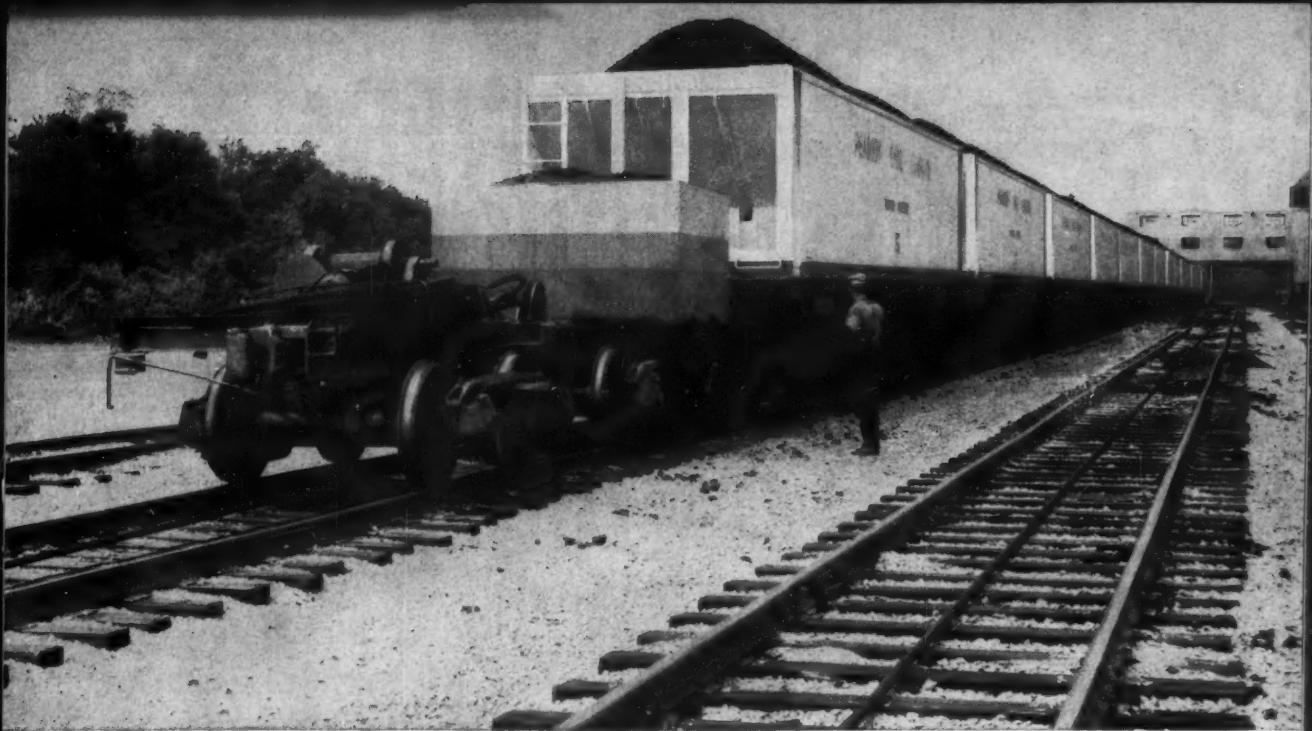
Free folder gives further information on Sterling Rock Salt for mines, collieries. Ask your Sterling representative or write to **INTERNATIONAL SALT COMPANY, DEPARTMENT CA-11, CLARKS SUMMIT, PA.**

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STERLING ROCK SALT
INTERNATIONAL SALT COMPANY, INC.



Car haulage system at River Queen Mine handles 15 cars of coal.

1,875 tons moved with one Tiger Brand Wire Rope

This automatic car moving equipment at the Peabody Coal Company River Queen Mine in Western Kentucky near Central City is rigged with 8,246 feet of 1 3/4-inch diameter USS Tiger Brand Wire Rope. It hauls 15 cars per trip with a total weight of 1,875 tons and could handle even greater loads. The system operates four 15-car trips per shift, two shifts per day.

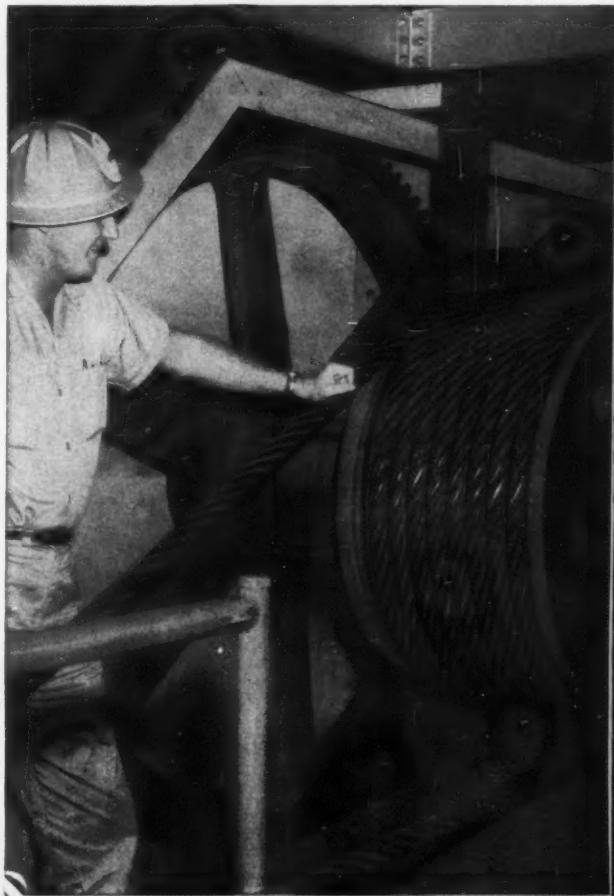
The transmission rope in this service takes quite a beating. Starting loads get heavier as each car is filled. Bending stresses are high and the rope is, at times, subjected to severe abrasion. To meet these conditions, they use a strong, tough Monitor steel rope. Construction is 6 x 37, Excelley Preformed with fiber core.

Why USS Tiger Brand is your best buy. Tiger Brand Wire Rope is designed by one of the country's most capable staffs of wire rope engineers. It is made by a company that maintains the most complete research and manufacturing facilities in the steel industry. When you buy Tiger Brand you get the *right* rope for the job. And your job is only a phone call away from experienced American Steel & Wire field service representatives.

For more information, write American Steel & Wire, 614 Superior Avenue, N.W., Cleveland 13, Ohio, or contact your nearest Tiger Brand Wire Rope distributor.

USS and Tiger Brand are registered trademarks

Drive unit rigged with 1 3/4" diameter Tiger Brand Wire Rope designed for strength, flexibility and long wear.



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LOWER DUST COUNT THAN WET DRILLING

VERSATILE S12VT STOPER

is adaptable for hand-held or jumbo-mounted operation. Available with 34" and 52" feed legs — in weights of 92 and 98 lbs.

with Le Roi S12VT "Dustless" Stopers

This hard-hitting stoper gives you more benefits and eliminates all of the problems and expenses of wet drilling! It delivers 20% harder, faster blows than comparable machines — has a much lower dust-count than wet drilling. Its exclusive dust-collecting system passes cuttings through the chuck housing — *not through the stoper!* Tools work better, last longer. Steel *never* sticks even in soft, wet formations — or in hard strata.

Special aluminum-alloy leg reduces weight, stops corrosion, and cuts maintenance. Controls are on the leg — not on the stoper — for better balance and easier operation.

Get the complete story from your Le Roi distributor. Or write to Le Roi Division, Westinghouse Air Brake Co., Sidney, Ohio.

NEW LX-1
DUST
COLLECTOR
TANK
*never needs
emptying —
dumps
automatically.*



LE ROI
NEWMATIC®
AIR TOOLS

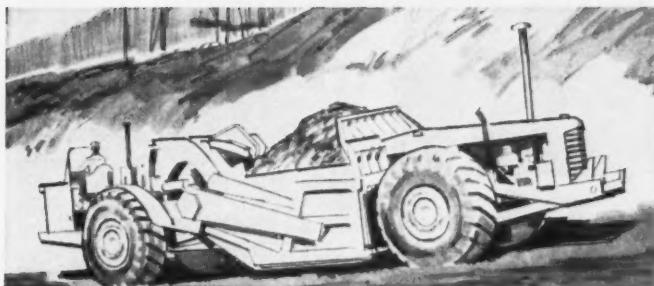


PORTABLE AND TRACTAIR AIR COMPRESSORS • STATIONARY AIR COMPRESSORS • AIR TOOLS

Distributed in the Coal Fields by: Acme Machinery Company, Huntington, West Virginia, and Equipment Service Company, Inc., Birmingham, Alabama.

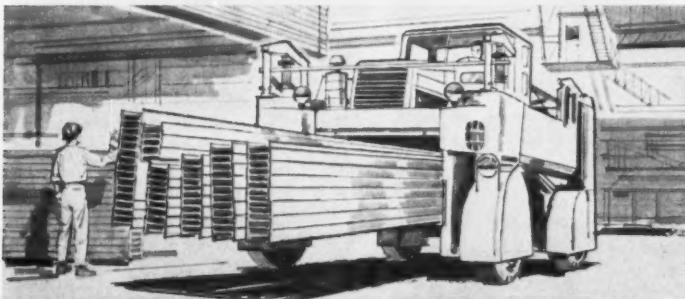
AT-501

ALLISON smooths out starts TORQMATICALLY



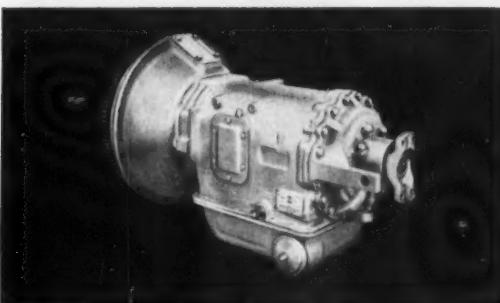
IN 14-YARD SCRAPERS

"Twin Power"—made possible by twin Allison CT-3340 TORQMATIC DRIVES in this Euclid TS-14 scraper—makes every operation smoother. Production is as much as 100% higher, cost per yard 50% less, than for scrapers pulled by tractors.



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"Easy Does It" for 30-Ton Loads—Equipped with an Allison CT-3340 TORQMATIC DRIVE, this Gerlinger Material Handler starts 20- and 30-ton loads slick as a whistle for an Eastern steel producer. Unit works 24 hours a day, five days a week, has cut steel handling costs 50%.



IN ANY 125-175 H.P. UNIT

Small off-highway trucks, fire trucks, airport tow tractors, graders—a whole long list of equipment becomes better equipment with an Allison CT-3340 TORQMATIC DRIVE.

This torque converter-hydraulic transmission team has 4 speeds forward, 2 reverse—converter-driven PTO—drive line parking brake—full power shifts at all speeds—optional lockup clutch—can be direct or remote engine mounted.

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SPEAKERS—M. E. Altimus Jr. (left), U. S. Steel Corp., session chairman; H. J. Young, Cooke Wilson Electric Supply Co.; R. S. James, U. S. Bureau of Mines; A. E. Molinski, Bethlehem Mines Corp.; and F. R. Hugus, Joy Mfg. Co.

Mining Electro-Mechanical Maintenance Association studies . . .

Safety and Maintenance

SAFETY from the mining machinery manufacturer's viewpoint, experience with fire-resistant hydraulic fluid and safety in maintenance were major themes at ME-MMA's eighth annual general meeting held September 24 at the Mountain View Hotel, Greensburg, Pa. The one day meeting drew more than 225 electrical and mechanical specialists, manufacturer's representatives and mine supervisors.

Myles E. Altimus Jr., Frick District, U. S. Steel Corp., Uniontown, Pa. presided at the general session and H. J. Young, district sales manager, Cooke Wilson Electric Supply Co., Ebensburg, Pa., first vice president of ME-MMA, delivered the welcoming address. D. C. Jones, director, mineral industries continuing education, Pennsylvania State University, University Park, Pa., was toastmaster at the annual banquet and Harry A. Stuhldreher, assistant to the vice president, personnel, U. S. Steel Corp. was speaker. C. S. Conrad, Mountaineer Coal Co., made the presentation of the award for the Maintenance Idea of the Year and A. V. Sypnieski, Rochester & Pittsburgh Coal Co., announced the Branch Award winner.

Following are abstracts of the technical papers.

A Mining Machinery Manufacturer's Viewpoints on Safety, Frank R. Hugus, chief electrical engineer, coal machinery div., Joy Mfg. Co., Franklin, Pa.

Safety must be built into a machine as it is being manufactured. When the specifications for a safely designed machine are given to the manufacturing department, it is then their responsibility to apply all their skill, experience and knowledge to the construction of the machine so that the customer will be assured of receiving a safe machine. The inspections and quality control department is charged with the responsibility for guaranteeing safety in a machine, but this department must be given full cooperation from all men in the company.

Several shop practices illustrate the attention to detail that is needed to build quality and safety into machines:

1. After the flame paths of an electrical compartment have been machined carefully, they are covered with a protective tape. This tape guards the flame paths against abuse and warns men to protect these surfaces.

2. Recently we have been painting the inside of electrical controllers with white paint. This paint has the same insulating quality as conventional insulating paint with which compartments formerly were painted. It provides better visibility so that a workman is able to see his work better and it impresses the workman with the fact that he is working on a quality part.

3. An electrical ground on a machine may seriously shock a workman or may cause the machine to operate improperly, thereby endangering workmen. As a safe-

guard against grounds each portion of the electrical system on all machines is given a high potential test. Double nameplate voltage plus 1,100 times 80% is applied to all parts of the circuit.

Maximum safety and dependability is assured when replacement parts equal to or better than the original machine parts are used. Quality, dependability and safety often cause some replacement parts to cost a little more than others. This slight price difference usually is more than recovered by more dependable operation and longer life from the better parts.

Some suggestions for improving safety are:

1. Provide plugs at the machine end of trailing cables so they can be changed quickly. Many fires are caused by cables because it is difficult to make an adequate and safe temporary splice while the cable is attached to a machine that is expected to produce coal.

2. Many men feel that a practical automatic cycling system can be devised for continuous miners. This will provide more accurate and dependable machine control and will reduce operator fatigue so that safety will be improved.

3. The American Mining Congress has sponsored a program whereby operators are requested to furnish information on trailing cables. It is expected that this will lead to improvements in cable manufacture, application and maintenance so that hazards will be reduced.

4. Arrangements should be made by the Bureau of Mines and various state departments so that accident reports involving mining machinery can be distributed to manufacturers. These reports will indicate improvements that can be made in design and give the manufacturer's employees a better understanding of the safety requirements for the machine.

5. Some states have mining laws that are out of date and prevent mines from taking full advantage of improved, safer and more efficient machines and mining techniques available today. Uniform state mining laws will benefit the industry.

6. On a broader scale it is desirable that information be exchanged between countries. Information we receive from foreign countries reveals many interesting and sometimes profitable ways of solving problems here.

Fire-Resistant Hydraulic Fluid Experience, A. E. Molinski, maintenance supervisor, Bethlehem Mines Corp., Johnstown, Pa.

Nearly all mining machinery has some type of hydraulic system requiring 5 to 250 gal of oil. Since there is always the combination of oil and electricity present underground there is the hazard of fire. In the drive for safety, something had to be done to eliminate fires. As a consequence, about 5 yr ago a search was

started for a fire-resistant hydraulic fluid. About 1 yr ago the Bureau of Mines worked up a schedule for fire-resistant fluid and several have been approved.

Tests made with a Colmol containing fire-resistant fluid were better than expected. After the first full shift of producing coal, tests showed that fluid temperature never rose above 113 deg. Subsequent periodic checks also showed favorable results.

After 2 mo of operation four samples of fire-resistant hydraulic fluid were tested. Results are as follows: viscosity 436 sec v 400 sec for new fluid; pH 10.125 v 10.0 for new fluid; and specific gravity 22.3 v 22.1. Percentage of water remained at 40. Fluid consumption was about half of that experienced with oil, but may have been the result of closer attention given to the system. The Colmol seems to work better but the improvement might be the result of changes

made in the suction pressures of the hydraulic system.

Safety in Maintenance, R. S. James, chief, Electrical-Mechanical Testing Branch, U. S. Bureau of Mines, Pittsburgh, Pa.

One philosophy commonly found among maintenance men is to run a machine until it quits. Another is to provide only enough maintenance to keep a machine running. In the latter instance, equipment receives plenty of grease but nothing is done to keep the machines in safe operating condition. A third philosophy requires proper maintenance and results in efficient mining, long life for machines and better than marginal safety.

Because of the greater concentration of mining there is a need for close maintenance of ventilation systems. A new miniature methane detector that can be carried in a trouser pocket may

be helpful in getting more accurate detection of methane. Methane monitoring systems should prove helpful in reducing the ignition hazard at the face. Intrinsically safe circuits for controls also are valuable in preventing ignitions.

Better education is needed in maintenance and safety. Complex modern machines require better trained maintenance men. These men can not know too much about the laws of nature and principles of maintenance.

Trailing cables are the weakest link in the permissible chain. Efforts are being made to develop better cables and maintenance methods.

All the elements needed for proper maintenance, efficient machine operation as well as safety are available from universities, State and Federal agencies, organization like ME-MMA, manufacturers and men at the mine. Companies should take full advantages of services available.



AWARD WINNER—C. S. Conrad (left), Mountaineer Coal Co., presents award for maintenance idea of the year to Ken Herslein who represented the award-winning Conemaugh shop staff, Bethlehem Mines Corp., Johnstown, Pa.



BRANCH AWARD—A. E. Molinski (left), Bethlehem Mines Corp., Johnstown, Pa. and ME-MMA secretary-treasurer, accepts award for Johnstown branch from A. V. Sypnieski, Rochester & Pittsburgh Coal Co., Indiana, Pa.

Maintenance Idea of the Year Award

A three-way tie for first place in the contest for the Maintenance Idea of the Year was broken by balloting of the association members during the technical session. In a very close vote, the idea contributed by the staff of the Conemaugh shop, Bethlehem Mines Corp., Johnstown, Pa., was selected for the top award. The other two ideas in the three-way tie were submitted by the maintenance group of the Wyatt-Seanor Coal Corp., Saltsburg, Pa., and Francis Baker, Mountaineer Coal Co., Monongah, W. Va.

The award-winning Conemaugh group eliminated the cable-reel case on the 6SC shuttle car and at the same time raised

the reel and motor mountings to provide more clearance. As a result, maintenance of reels and hydraulic motors has been considerably reduced. Cable life is now much longer and much time is saved in servicing the reel, reel motor and in changing cable. Before the changes were made the reel case was always full of coal, the reel and reel motor would become fouled causing cable breakage.

The Wyatt-Seanor maintenance team solved a gear-case contamination problem of Fletcher DAEC-7 roof drills by enlarging the cover on the chuck and quill shaft from 4 $\frac{1}{2}$ to 7 in and installing four $\frac{1}{2}$ -in-square key-steel slingers. Four remodeled drills have been in service

three shifts per day since February, 1960 and up to May, 1960 no repairs were made. Lubrication was reduced to once a week.

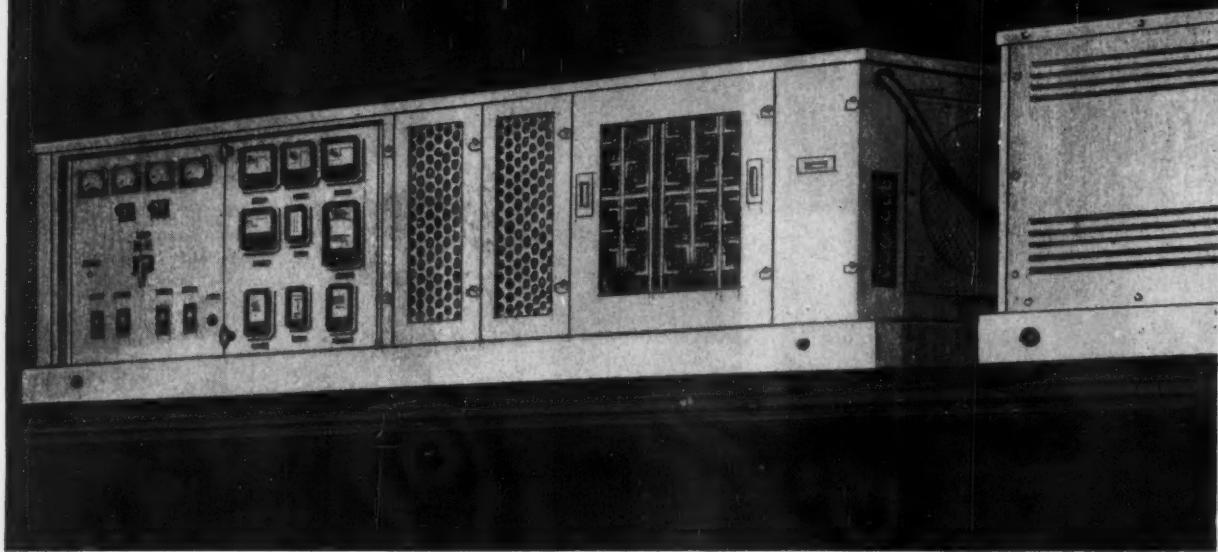
Before the changes were made, two roof-bolt drills used nine complete gear cases at a material cost of \$339.93. Oil changes were instituted on a weekly, daily and shift basis without success. A constant pressure and volume of oil through an orifice was installed but the gear case still failed.

The second runner-up, Francis Baker of the Mountaineer Coal Co., improved the high-pressure oil-transfer tube on a Joy Twin Borer to eliminate failure of the lead packing in the stuffing box. Alterations included increasing the diameter of the gland end of the transfer tube slightly and chrome plating it for minimum friction on the O-ring seals. The stuffing box was then entirely fabricated with two O-ring seal fits and two ball bearings. The first new unit has been in operation 6 mo without failure, downtime or oil leakage into the gear case.

The tube transfers hydraulic oil through the main transmission case, and the tube rotates while the carrier and stuffing box is stationary. The lead packing used in the stuffing box costs \$40.45. At one mine 15 sets of packing were used in 12 mo before the changes were made.

An idea submitted by Glen Campbell and Grover Foltz Jr., inside shop foremen, Earnest No. 3 mine, Rochester & Pittsburgh Coal Co., Indiana, Pa. placed fourth in the contest. By making a new bearing box that can be installed on the swivel arm of a 14 BU loader before the arm is put in place, they cut installation time in half and also provided a good installation. The new bearing box is held in place by four $\frac{3}{4}$ -in studs.

**The facts speak
for themselves...**



WESTINGHOUSE PORTABLE

as d-c power supplies

- **cost less than**
- Ignitron rectifiers**
- **are more efficient**
- **are far shorter**
- **need far less maintenance**

Early in 1957, Westinghouse proposed the first commercial use of silicon rectifiers for d-c conversion in mining.

Like the rest of the electrical industry at that time, Westinghouse was firmly committed to the Ignitron system. But intensive investigation had proved to us that silicon's superiorities could no longer be overlooked. Silicon provides a lower cost, more efficient and more compact rectifier, one that is more reliable—silicon cells don't age, so there's nothing to wear out. One that requires less maintenance



SILICON RECTIFIERS

—there are no complex excitation circuits, no vacuum tubes, no water cooling necessary.

Since 1957, Westinghouse has built a number of portable silicon rectifiers in ratings up to and including 750 kw. We shall be glad to send you the names of Westinghouse Silicon Rectifier users near you so you may ask them about their experience and opinions. For complete facts, call your Westinghouse representative, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. You can be sure . . . if it's Westinghouse.

J-15020

Westinghouse





SPEAKERS, OFFICERS, GUESTS—Royce Hardy (seated left), Assistant Secretary of the Interior; G. E. Owen, Imperial Coal Corp., retiring association president; Heath Clark, Rochester & Pittsburgh Coal Co., incoming association president; and Reed Scollon, U. S. Bureau of Mines. R. T. Laing (standing left), association secretary-treasurer; Harry Gandy, National Coal Association; Larry Cook, Ohio Reclamation Association; Joseph E. Moody, president, Southern Coal Producers Association; Ed Fox, president, Bituminous Coal Operators Association; and W. R. Cunningham, Deputy Secretary, Pennsylvania Department of Mines & Mineral Industries.

Central Pa. Association Meets At Bedford

AIR AND WATER POLLUTION was the theme of the general sessions at the 1960 meeting of the Central Pennsylvania Coal Producers Association and Eastern Bituminous Coal Association, at Bedford, Pa., Sept. 26-27.

On air pollution, Harry C. Ballman, manager, Air Pollution Central Div., National Coal Association, noted that one of the industry's jobs is to bring people up to date on the nature of the problem, which is now big business and must be handled as such. Pollution by plants using coal and pollution from mine operations are the two big items. The industry, Mr. Ballman urged, should stay ahead of governmental bodies, meaning that it should set up its own program and carry it out vigorously.

On water pollution, L. S. Morgan, chief, Mine Drainage Sec., Pennsylvania Dept. of Health, reviewed legislation and rulings affecting operations in the Commonwealth. He made a special point of recommending that pumping loads be split rather than concentrated to avoid sludging streams with acid.

Discussing the operations of the Ohio River Valley Sanitary Water Commission, Larry Cook, Ohio Reclamation Association and chairman of the Coal Industry Advisory Committee, noted that his committee had told ORSANCO that it would cooperate to the fullest in cleaning up streams and keeping them clean, including handling acid. The industry must do its part in the cleanup. A major need is more research into what the

problems are and what can be done about them. In addition he urged that operators keep thorough and accurate records of progress in drainage control, including any unusual occurrences in particular to help themselves and others.

Association directors were chosen as follows:

Central Pennsylvania:

T. L. Aitken, Pennsylvania Coal & Coke Div. of Fairbanks Whitney Corp., Cresson

Charles B. Baton, Carpentertown Coal & Coke Co., Pittsburgh

Otes Bennett, Conemaugh Mining Co., Seward

Heath S. Clark, Rochester & Pittsburgh Coal Co., Indiana

A. B. Crichton Jr., Crichton Coal & Coke Co., Johnstown

Clarence A. Dobson, Allegheny River Mining Co., Kittanning

John Emerick Jr., Cambria Clearfield Mining Co., St. Benedict

H. John Harper, Eastern Gas & Fuel Associates, Coal Div., Pittsburgh

Donald E. Hartman, Pennsylvania Coal & Coke Div. of Fairbanks Whitney Corp., Cresson

John W. Krouse, Imperial Coal Corp., Johnstown

John K. McCarthy, The Morrisdale Coal Mining Co., Morrisdale

W. J. B. Mayo, Eastern Gas & Fuel Associates, Coal Div., Melcroft

Ralph E. Moore, Rich Hill Coal Mining Corp., Cresson

Harold K. Powell, Powell Coal Co., Kittanning

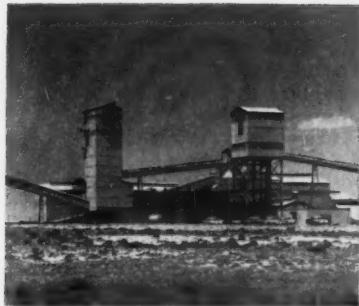
Robert H. Seese, The Berwind-White Coal Mining Co., Windber

Joseph E. Smith, Wyatt-Seanor Coal Co., Saltsburg

(Continued on p 132)



OFFICERS—R. T. Todhunter Jr. (left), Barnes & Tucker Co. and T. F. McCarthy, Clearfield Bituminous Coal Corp.



**Ropes on Koepe Hoist
Handle 2,400,000 Tons
in Potash Mine in
New Mexico**

Serving for 26 months on a Koepe skip hoist at National Potash Company's mine, Carlsbad, New Mexico, Bethlehem Wire Rope handled approximately 2,400,000 tons of corrosive ore. The hoist cables were 1-in. 6 x 27 Form-Set Purple Strand, with fiber core; 1½-in. 19 x 19 Form-Set mild plow, non-rotating rope was used for the tail lines.

Economical service is something you can rely on when you specify Bethlehem Wire Rope. Put it to work and you can count on faithful rope performance, shift after shift.



BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation

There's a distributor of Bethlehem Rope near you, supplied by our nationwide network of wire rope mill depots.

Mineworkers Meet in Cincinnati

"ROUTINE" is perhaps one description of the tenor of the 43d constitutional convention of the United Mine Workers of America, at Cincinnati, Oct. 4-12. The fireworks of some conventions were absent and even the arguments were muted as compared to former years—perhaps in part because of the lesser role of the former star performer: John L. Lewis. Mr. Lewis did not appear in Cincinnati until the second day of the convention and thereafter contented himself with an address at the union banquet, emphasizing the need for members to guard their union, and with explaining and defending the operations of the Welfare and Retirement Fund, and beating off again the group campaigning for autonomy in provisional districts. Otherwise, the convention was run by Thomas Kennedy, who succeeded Mr. Lewis as president; W. A. Boyle, vice president; and John Owens, secretary-treasurer. Since no one has filed other nominations, Messrs. Kennedy, Boyle and Owens will be continued in office in the forthcoming election.

Matters considered important enough to elicit lengthy statements by the officials included the following:

Business Investments, Mr. Owens—UMWA investments, loans or pledges include the Chesapeake & Ohio Ry., American Coal Shipping, Cleveland Electric Illuminating Co., Tampa Electric Co., Union Electric Co., Illinois Central R.R., Tri-Continental Corp. (Eaton Investment Co.)—"All blue chip securities. They have all paid interest, they have all increased in value, and in 10 yr—take this home—in 10 yr since 1950 your investments have yielded in profits and dividends \$14,623,290. The enemies of organized labor do not want to see you make this money." Two other major investments are the group of banks known as The National Bank of Washington, and the West Kentucky and Nashville coal companies. The latter resulted in the companies becoming union, and their prospects are excellent. A credit advance of \$5,200,000 to the Coaldale Mining Co. in anthracite, and to Pittsburgh & Midway resulted in continued payment of wages and Welfare-Fund contributions and "brought about stability."

Bituminous Welfare Fund, Mr. Lewis—"This welfare plan will endure just as long as this union is strong enough to protect it. That's all. Let your union become weak, let controversy rage through your ranks, and you won't have a Welfare Fund long. They will gladly take it away from you. . . .

"Yet because of an action in 1960, which the trustees were obliged to make effective the first of July, voices have

been raised in several areas in the industry in criticism and in condemnation of the fund. The privilege of having a hospital card had to be curtailed for an indefinite time and limited to one year's possession of a hospital card after separation of the individual from the industry. Committees have been formed, meetings held and literature distributed in derogation of the fund and those responsible for the decision and for the administration of the fund. There is nothing that the United Mine Workers as an organization can do about it. Under the contract and under the law only the trustees of the fund shall determine those questions, and the trustees have determined that the fund cannot continue indefinitely to pay out more money to the beneficiaries than it receives in royalties from the industry. That is pretty simple arithmetic for anybody to understand."

Anthracite Health and Welfare Fund, Mr. Kennedy—"We were required about 3 or 4 yr ago to reduce the pensions from \$100 per mo to \$50 per mo, and we are having extreme difficulty in meeting even this obligation. We have over 16,000 men on pension in the anthracite region. We have a working force of 13,000, and from those figures you can get some idea as to the problem that we have with respect to the anthracite Health and Welfare Fund. We haven't been able to pay death benefits for the past several years. . . .

"We are doing the best we can in anthracite to make this fund work. Lack of production is our problem, as the lack of production, in a minor way, is your problem in the bituminous. Your International officers believe—and the operators in the anthracite have joined us in that belief—that eventually the solution of our problems in the anthracite can come about by a merger of the anthracite and the Bituminous welfare funds. That is not a problem that can be worked out in this convention. It can only be worked out in collective bargaining."

Autonomy, Mr. Lewis—"When I came into office we had autonomy in every district, but nothing else of consequence. Autonomy had not produced the results that this membership of ours desired, but it had produced successfully a mass of something that some people call democracy, which, translated into modern English, meant labor-union inefficiency . . .

"I would not think that this convention would want its new president and its new administration to be handicapped in the beginning of that administration, in these troublous times, by having to devote half of his time to participating in the internal political quarrels in various districts that

are gnawing at the strength of those unions to the detriment of the men who pay their dues.

"There isn't anything new to be said about autonomy. In convention after convention since 1938 we have had that question aired. I said 4 yr ago in discussion of this matter that this question has become a mangy poodle dog that you fellows bring out and lead around on a string every time we have a convention in order to get some publicity about it and insult the intelligence of the thoughtful, mature membership of this organization, upon whom we have to rely for its perpetuity. . . .

"We are devoting a little time again this morning to explain autonomy again to those who are here making it an issue. I hope we shall not have to explain it too often or make a profession out of explaining all the time."

CPA Meeting

(Continued from p 130)

J. D. Sutton, Clearfield Bituminous Coal Corp., Indiana

John S. Todhunter, Barnes & Tucker Co., Barnesboro.

R. T. Todhunter Jr., Barnes & Tucker Co., Barnesboro.

Whitney Warner Jr., Sterling Coal Co., Haverford.

Eastern Bituminous:

Charles G. Berwind Jr., The Berwind-White Coal Mining Co., Philadelphia.

Heath S. Clark, Rochester & Pittsburgh Coal Co.

Matthew A. Crawford, Allegheny River Mining Co., Kittanning.

A. R. Davidson, Maple Hill Coal Co., Clearfield.

Sam Light, Coal Mining Company of Graceton, Inc., Punxsutawney.

John Barnes Mull, Barnes & Tucker Co., Haverford.

George E. Owen, Imperial Coal Corp., New York City.

Robert H. Seese, The Berwind-White Coal Mining Co.

R. T. Todhunter Jr., Barnes & Tucker Co.

R. S. Walker, Bradford Coal Co., Bigler.

Whitney Warner Jr., Sterling Coal Co.

R. W. Wigton, The Morrisdale Coal Mining Co., Philadelphia.

Harold D. Woolridge, Woolridge Coal Co., Clearfield.

The directors chose Mr. Clark as president of the two associations, succeeding Mr. Owen. Other officers are:

Vice presidents—**R. H. Seese** and **R. T. Todhunter Jr.**

Secretary-Treasurer—**Robert T. Laing**, State College, Pa.

Assistant Treasurer—**C. P. O'Neill**, Altoona, Pa.

General Counsel—**Frank G. Smith**, Clearfield, Pa.

Mineral Producers Meet

SAFETY with excavating equipment and "Orsanco Water-Pollution Control Activities," both presented in film form, plus "Blasting With Ammonium Nitrate," a panel discussion, and a look at Pennsylvania coal prospects featured the 5th annual meeting of the Independent Mineral Producers' Association at Pittsburgh, Oct. 14. At the business meeting the members re-elected the existing officers, with one exception, as follows:

President—James O. Anderson, Tri-County Fuel Co., Boyers, Pa.

Chairman of the Board of Directors—W. C. Altwater, Pittsburgh & Shawmut Coal Co., Kittanning, Pa.

Vice President—Kenneth McFarland, G. A. Stiles Co., Tylersburg, Pa., succeeding Clifford Turner, Turner Bros. Construction Co.

Executive Vice President—Franklin H. Mohney.

Secretary-Treasurer—James P. MacFarlane.

Presented by Clark Equipment Co., Construction Machinery Div., and the Allied Equipment Corp., the safety film was entitled "The Quota." The film on Orsanco operations and water-pollution control progress was introduced by F. W. Montanari, Orsanco sanitary engineer.

Blasting with ammonium nitrate was handled by a panel consisting of Lee Sparks, Atlas Powder Co.; Ron Smith, Austin Powder Co.; and Gerald L. Spaeth, Monsanto Chemical Co.

Not all questions connected with the use of AN-fuel oil blasting agents have been answered, said Mr. Sparks, but the following is generally so: 1 gal of oil per 80-lb bag of AN usually provides maximum efficiency, a gel of at least 75% strength is the best primer; for better detonation and control the charges should be detonated from the bottoms of the holes using millisecond caps. Using 75 gel, weight of the priming charge can be as low as 1% of the total charge.

Discussing Monsanto research into AN use, Mr. Spaeth observed that work was now being completed that "would provide for on-the-site tailor-making of ammonium nitrate-fuel oil mixtures with:

"1. Detonation velocities in the range of 8,000 to 20,000 fps.

"2. Densities in the range of 50 to 75 lb per cu ft.

"3. Sensitivities to match the need for small-hole or shallow-hole blasting while maintaining a non-cap-sensitive classification.

"Low-velocity high-density mixtures for packaged wet-hole blasting in plastic mixtures for increased borehole spacing on hard inelastic rocks, and light- or heavy-density mixtures reliable with single primers in holes as small as 1 in in diameter will all be possible . . . with

only two raw materials—prilled ammonium nitrate and diesel fuel."

Comparing 1913 and 1959 in the featured address at the association banquet, Robert T. Laing, executive director, Central Pennsylvania Coal Producers Association, noted a major decline in number of employees in the Pennsylvania bituminous regions, as well as in tonnage to certain markets, notably railroads, and in total tonnage—from 173 million to 65 million. Tons per man rose, however, from 3.62 to 9.97, with stripping now accounting for 31.7% of the output.

Looking at the future, Mr. Laing observed that Pennsylvania's opportunities were good. Many types of coal and big reserves are among the Commonwealth's assets, while overall competitive pressure should not increase. In addition, there are a number of steps that can be taken to keep the industry healthy, including the promotion of more cooperative effort, more research, better public and governmental relations, increased progress in mining, preparation and low-cost transportation to market, consolidation of properties, guarding against punitive regulation and legislation, and cooperation in preventing air and water pollution.

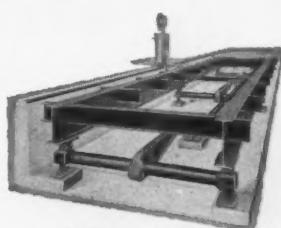
Winslow

TRUCK SCALES

PIT AND PITLESS TYPES



TYPE CS—PORTABLE—PITLESS
Capacities 15 tons thru 70 tons. Platform sizes 18' x 9' thru 50' x 10', wood or steel deck.



TYPE S—PIT SCALE
Capacities 15 tons thru 60 tons. Platform sizes 22' x 9' thru 60' x 10' for wood or concrete decks.

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ABC
MINE
VENTILATION
PRODUCTS*

No sir, you can't lose when you bet on ABC Products, because they are based upon a third of a century of experience. They have withstood the test of time.

MineVent FLEXIBLE VENTILATION TUBING—famous for its long service life. Easy to couple, easy to hang. All practical diameters and lengths.

MineDuct WIRE REINFORCED TUBING for pulling foul air and dust away from the working face.

ABC BRATTICE CLOTH—7 kinds to meet every requirement and budget—all carefully processed to render them flameproof, mildewproof, moistureproof.

ABC TROLLEY GUARD—two types—for maximum safety.

ABC POWDER BAGS—for safely transporting explosives.

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CLOTH CORP.

200 KING'S HIGHWAY, WARSAW, IND.





A COAL FIELD FAVORITE

For 18 years, Marion Walking Draglines have been providing practical solutions for coal stripping problems. They do it in a very simple way... by giving the operator the plus features he needs to make himself and the machine look good on the job. These include the reach necessary to stack overburden high and far away; the capacity to move big yardage consistently; the ability to work and travel on soft footing without danger of bogging down. Marion

Walkers are available in sizes from 5 to 40 cubic yards and carrying boom lengths to 280 feet. Pictured is a Marion 7400 carrying a 13-yard bucket on 175 feet of boom in a Pennsylvania stripping operation. Write for Bulletins 426, 427, 428 and 429 describing the entire line of diesel-electric and full-electric powered Marion Walkers. The Marion Power Shovel Company, Marion, Ohio. A Division of Universal Marion Corporation.

MARION WALKING DRAGLINES



Only Spencer uses military type underwater tests to determine the relative effectiveness of commercial explosives. These tests are the latest in a continuing research program conducted by Spencer Chemical Company, the pioneer supplier of solid ammonium nitrate as an ingredient in blasting.

Precise new underwater testing method shows . . .

Spencer N-IV And Fuel Oil Produces Up To 7 Times As Much Useful Energy Per Dollar

. . . when compared with gelatin dynamites

How do you measure the true blasting effectiveness of commercial explosives? Unsatisfied with present methods, Spencer Chemical Company and a well known research organization teamed up to discover a better way.

After extensive investigation Spencer adopted underwater testing methods developed through military research. These were found to provide data better related to commercial blasting than any other testing method. As a result, more accurate standards of evaluating the actual useful output of explosives have been developed.

Latest test results show that Spencer N-IV Ammonium Nitrate and fuel oil deliver up to seven times as much useful energy per dollar as gelatin dynamites (see chart at right).

Extensive research has also shown that Spencer N-IV, when mixed with the recommended 6% fuel oil, delivers 20% to 25% more blast energy than equal charges of other solid ammonium nitrate-fuel oil mixtures. There are two main reasons for this: (1) lower density which provides greater ease of detonation, (2) special prill structure which allows fuel oil to be absorbed more evenly.

It costs you nothing to get the full benefits of Spencer's advanced knowledge and experience in this field. Just mail this coupon. No obligation of course.

PERFORMANCE COMPARISON OF BLASTING MATERIALS				
Explosive	Heaving Energy Ft. Tons/Lb.	Shattering Energy Ft. Tons/Lb.	Effective Energy Ft. Tons/Lb.	Useful Energy Ft. Tons/\$
Spencer N-IV and Fuel Oil	423	60	483	14,230
40% Gelatin Dynamite	257	115	432	1,770
60% Gelatin Dynamite	384	84	372	1,800



Spencer Chemical Company
Industrial Ammonium Nitrate Sales
401 Dwight Building • Kansas City 5, Missouri
Without cost or obligation, please send me the latest information on the use of Spencer N-IV and fuel oil for blasting.

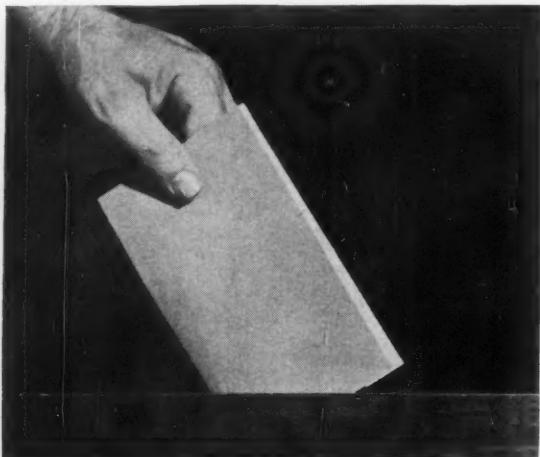
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Firm _____

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City _____ State _____

Foremen's Forum



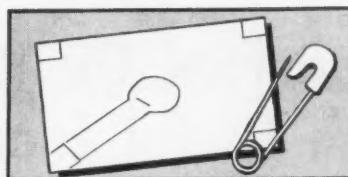
Back the Winner

AS THIS is written the national election is still in the future. The "Great Debate" rages, and voters' opinions are firmly forming in favor of one candidate or the other. As you read this now the election is history—we have a new president. He is a 100% American, deserving of the closed-ranks backing of all other Americans as he prepared to wrestle with crushing world problems. Loyal opposition will be needed, as always, but it will pay us to remember that the enemy is not the other party. The enemy consists of all the conditions and ideologies stalking the world that would prevent a man—any man—from developing his maximum potential in productivity and happiness. There is enough of a challenge in this for all. Let's get to work.

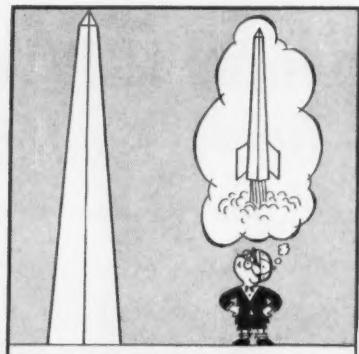
Kith and Kin

The Houghton Line, a publication of E. F. Houghton & Co., Philadelphia, is a delightful 4x7-in booklet that comes around. A recent issue offers advice to new fathers, as follows:

"First, place diaper in position of a baseball diamond with you at bat. Fold second base over home plate. Place baby on pitcher's mound. Then pin first and third to home plate." The editor of the *Houghton Line* credits Bendix Aviation Co. for this one.



In the same issue he tells of the parents who took their missile-minded youngster on a tour of Washington, D. C. When the boy saw the Washington Monument he stared and said, "They'll never get it off the ground."



Palaver With a Purpose

USE OF THE CONFERENCE by American business has increased rapidly since World War II, and during this period its primary role has changed from that of a training vehicle to an aid in solving operating problems, says the National Industrial Conference Board. The problem-solving conference as a management tool developed with widespread recognition of the necessity for decentralization and delegation. Conferences are expensive, and they may fail to achieve their goal if certain precautions are not observed, says NICB. The manager who calls a problem-solving conference must sincerely want the unbiased thinking of the group. Ideally, the conference leader does his best to refrain from influencing the group. He avoids making direct statements and asking leading questions.

The purpose is not to transfer the manager's power and authority to the group but to ensure that all aspects of a given problem are discovered and weighed before a final decision is made.

Special fastener does it better at half the cost



OLD BOLT

The sleeve-type bolt was used as a steel strapping handle for railroad cars. Not only was the weld expensive, but the part had inadequate strength for the holding of heavier loads.



NEW BOLT

Bethlehem fastener engineers designed this forged-eye bolt. A greatly increased strength resulted from both the new design and the use of a heavier material . . . at half the cost of the old style bolt!

Our ability to redesign fasteners is just one example of how our fastener engineers can study your problem. Perhaps a minor change—or a completely different design—can do your job better . . . and at lower cost. Bethlehem makes just about every type of steel fastener specialty—forgings, rods, bolts, nuts, and stampings.

Just send us a rough pencil sketch or drawing of the part you need, indicating dimensions. After our fasteners engi-

neers have studied it, we'll give you our honest appraisal of what we can do for you. If we can't recommend a practical solution, we'll say so. But if we can help you, and you are fully satisfied with our estimate, we're prepared to give you fast delivery. Just phone our nearest sales office.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

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for strength
... economy
... eye-appeal

BETHLEHEM STEEL



Whirling Cutlasses



ROB 'EM BLIND, then cut off their heads—a typical Buccaneer operation. From time to time in past years this correspondent has plagued you in print with moans or paeans as he followed the sine-curve fortunes of the Pittsburgh Pirates. This morning your correspondent is in the catbird seat around here. The Bucs are peerless champions of the whole wide world. Mission accomplished!

We suppose there are lessons in the rise of the Pirates that should stir the hearts of American youth, and all that stuff. Included are such lessons as . . . how the stout-hearted, apple-cheeked youngsters of "Sonny" Murtaugh stayed in there with the awesome Yankees until virtue triumphed . . . how 55 runs don't mean a thing if they come in excessively large clusters, and so on.

Oh, it's a nice day.

Traction Makes the Difference



ACTUAL DRIVING TESTS during harsh mid-winter conditions provided the data for two new booklets issued by the National Safety Council to help drivers of passenger cars and trucks. The booklet for truck drivers, "Keep Rolling With Safety in Winter Weather," outlines the six major hazards of winter driving, including increased braking distances and the effects of temperature on starting and stopping. Test facts on jackknifing and its prevention and on maintaining control in skids are explained in detail. Proper use of tire chains is discussed and strongly urged.

For passenger-car drivers, "Be a Winter Winner" offers a host of tips on safe winter driving. Checklists of maintenance steps for winterizing vehicles are included. Fleet owners are well-advised to look into these booklets. Single samples are available from National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

Report-Card Time

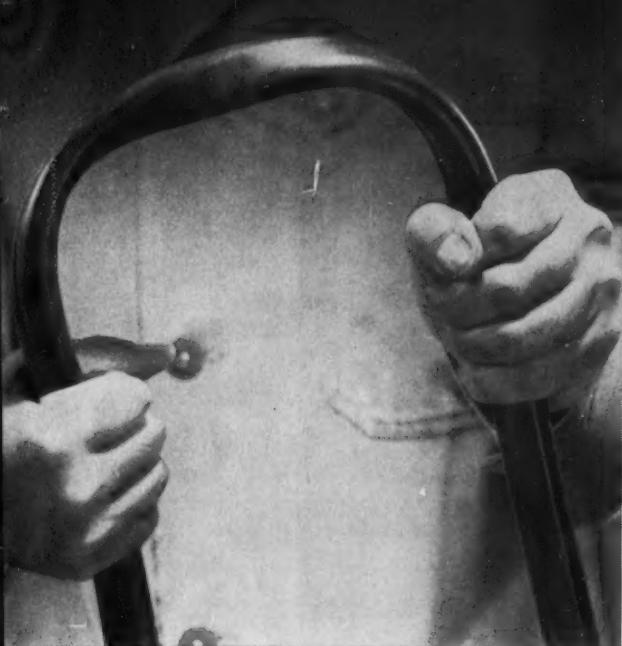
IF YOUR MINE is participating in the national campaign to prevent injuries from falls of roof the reports of your experience for the first 6 mo of 1960 are overdue. The forms were sent out to all participants a few weeks ago. It is vital to the success of the campaign that all reports be returned to the National Safety Council for compilation of the data. This constant emphasis on roof safety will have the desired effect. The sincere, continuous effort of foremen and management in this worthwhile campaign is required to cut the roof-fall toll.

ROOF FALLS HAVE NO RESPECT FOR OCCUPATION



FLIP

FLOP



NO STOP

HOW ROME MINING MACHINE CABLE PROTECTS AGAINST BREAKDOWNS

The cables on your shuttle cars and other equipment go through more contortions in one working shift than a tag-team wrestling match.

They flip. They flop. They twist. They flex. No holds barred.

This can mean breakdowns—more than you can afford. With ordinary shuttle car cables, "wrong-way" bends often cause the conductors to slip. This distorts the cable; one side may stretch, the other crimp. Perfect invitation to breakdown.

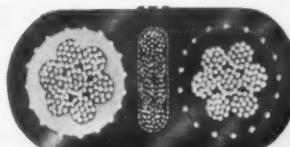
This can't happen when you use Rome 60 Parallel Duplex mining machine cable.

Try to bend Rome shuttle car cable the wrong way.

You can't. It just flips over and bends on its minor axis. That's because conductors and jacket are locked together to prevent damaging "wrong-way" bends.

That's just one way you'll move more coal at less cost with this cable. You'll also benefit from the relatively small diameter, easy-handling flexibility, and high resistance to impact, rotting, deterioration, moisture and physical abuse.

Rome Cable Division of Alcoa, Dept. 15-110, Rome, New York.



Neoprene jacket forms resilient web between power conductors and ground. Result: web and jacket are an integrated unit which binds entire cable securely together providing high impact resistance and protection against shorts while maintaining maximum flexibility.

ROME CABLE
DIVISION OF **ALCOA**

Operating Ideas

Grinder Smooths Rotary-Breaker Tire

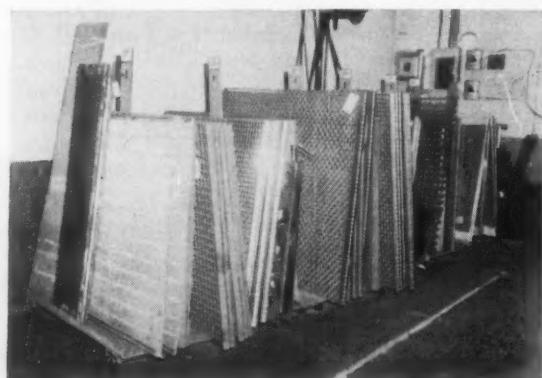
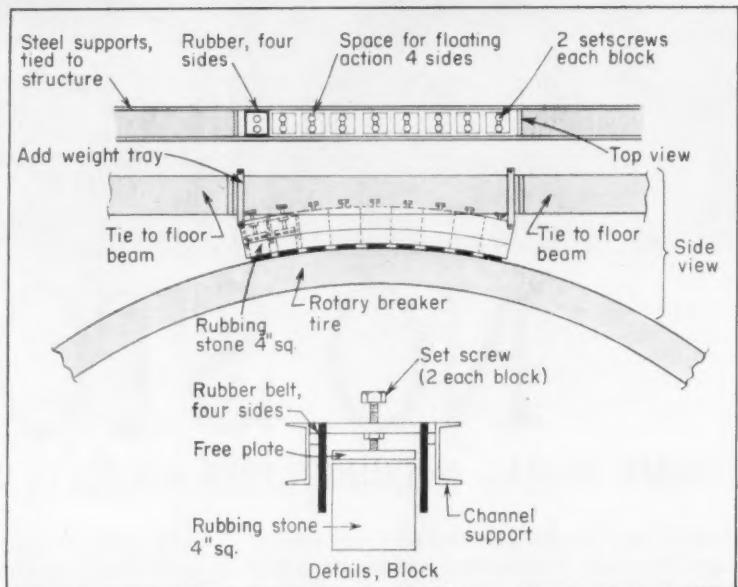
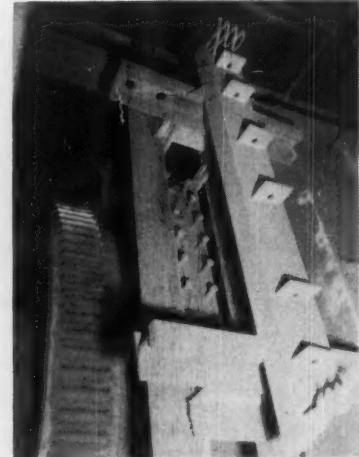
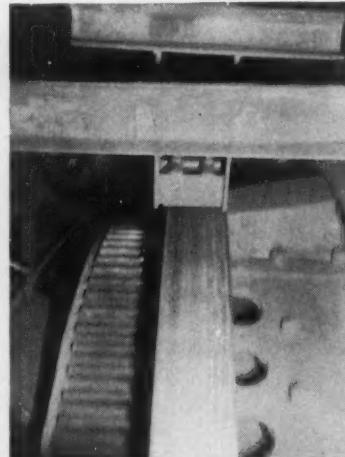
KEEPING the tire of a rotary breaker at Bell & Zoller's Zeigler No. 4 preparation plant, Johnston City, Ill., free of waves or irregularities no longer is a problem since a built-in grinder has been mounted on the unit.

Product of ideas contributed by Wesley Smith, preparation engineer, and John Mays, shop foreman, the polishing and grinding device consists of a series of rubbing stones that float up and down in a curved support over the breaker tire. The curved support is suspended from a floor beam. The stones rest on the breaker tire, polishing it as it turns and thus preventing formation of waves or irregularities. Wesley Smith, preparation engineer, notes that an irregular breaker tire causes structure vibration and could lead to trunnion shaft failure.

Floating action of each stone is controlled by two setscrews which regulate upward travel. Since the upward travel is regulated the stones exert more force on any high spot that develops.

Bell & Zoller developed the built-in grinder because conventional methods of truing the tire were not only too laborious but also did not do the job satisfactorily. The Zeigler No. 4 tire had developed a wavy surface with high points every $2\frac{1}{2}$ in. on the circumference. In an effort to correct this condition a Bell & Zoller mechanic mounted a bench grinder with a feed screw on a column near the tire and then moved the grinder back and forth across the tire. Results were not satisfactory.

When the built-in polisher was mounted against the tire it took about one week for it to true up the tire. The breaker has run for 2 yr with no problems.



Portable Racks Store Screens Better

PORTABLE steel racks provide orderly storage of spare screen cloth at Bell & Zoller's Zeigler (Ill.) No. 3 mine. Each rack is mounted on four small wheels and has a numbered identification board that lists the screens it holds. Each section of screen is further identified by its own tag showing the dimensions of the screen and the size of openings.

Lined up neatly along the wall of the supply house, the racks and screens are protected from the weather and are immediately accessible when the plant calls for a new screen. One man can pull a loaded rack into position for placing a screen on a truck or receiving incoming replacements.



At the point of penetration is where roof bit performance really counts.

For FAST PENETRATION ...try the new KENNAMETAL FDC ROOF BIT

This new Kennametal Roof Bit is designed to take full advantage of today's more powerful rotary and rotary percussion roof drills. In drilling $1\frac{1}{8}$ " to $1\frac{1}{4}$ " diameter holes, this bit gives rugged, dependable performance under the most severe roof conditions. Here are the reasons why:

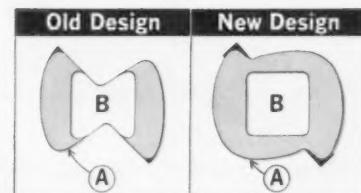
Through elimination of the water groove and complete redesign, the seating surface (see area "A" in sketch) between the base of the bit and the drill steel chuck has been increased substantially. This provides more rigid support to the bit, eliminates troublesome bit wobble, and contributes to longer drill steel life. It is advantageous to have the forces distributed over a larger seating area—particularly where high thrust or rotary percussion-type

drills exert even greater wear and impact on the drill steels and bits.

Another improvement, the square shank (see area "B" in sketch), allows for increased cross sectional area, which in turn means greater strength and rigidity.

The shape of the FDC Bit forging has also been changed to speed removal of cuttings from the hole. This new shape directs cuttings away from the shank and chuck, where packing would cut drilling efficiency.

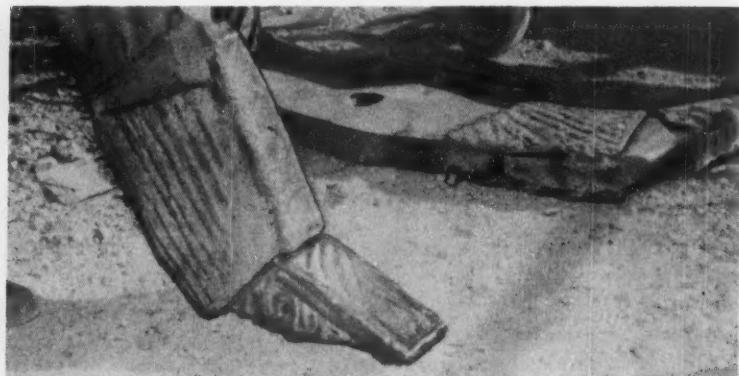
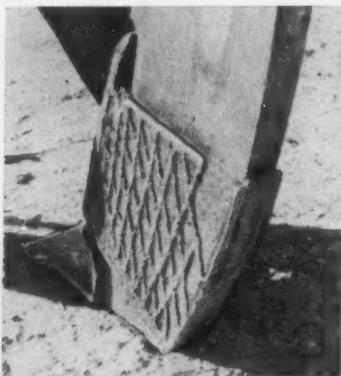
Remember . . . bits may look the same, but the difference shows up in performance. And roof bit performance begins at the point of penetration. Why not drill a few test roof holes at your mine with this new Kennametal bit? See for yourself. Contact your Kennametal Repre-



sentative. He can provide a style of Kennametal bit designed for most effective drilling in any roof formation. Call him or contact us direct. KENNAMETAL INC., Mining Tool Division, Bedford, Pennsylvania. Phone Bedford 755. 33560

INDUSTRY AND
KENNAMETAL
...Partners in Progress

Operating Ideas (Continued)



Hard-Facing "Non-weldable" Ripper Shanks

AN UNUSUAL METHOD of applying hard-facing to "non-weldable" ripper shanks has been developed by Silver State Construction Co., Fallon, Nev., according to *Fusion Facts*, published by the Stoody Co.

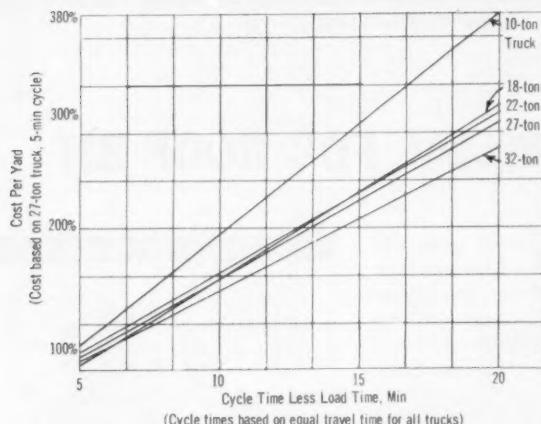
Silver State solves the problem of hard-facing the "non-weldable" ripper shanks by fabricating a protective sleeve, shaped to fit snugly on the lower part of the shank. The side sections and the back panel of the sleeve are cut from $\frac{1}{2}$ -in mild steel plate. The front panel,

cut from 1-in plow steel, is welded to the two side sections. This assembly is then slipped in place over the ripper tooth and the back section welded to the side sections. The lower part of the ripper shank is then completely enclosed. Since the protective sleeve fits exactly, it is not necessary to weld it to the "non-weldable" ripper shank.

Stoody 130, a tungsten carbide abrasion-resistant alloy semi-automatic wire, is applied on the front of the sleeve and also on the face of the regular replace-

able ripper tooth. Coated tube Stoodite, a high alloy manual electrode, is applied to the sides of the sleeve. The hard-faced sleeve acts as a protective shield around the ripper shank in the area where abrasion and impact are the most severe.

As wear occurs the hard facing is reapplied before the sleeve is damaged. Should the sleeve be allowed to wear to the point where it no longer serves its purpose, it is merely removed and a new sleeve installed.



Sizing Trucks to Shovels

CAREFUL ANALYSIS beats rule of thumb for sizing trucks to shovels, writes R. L. Brenkman, field engineer, LeTourneau-Westinghouse, in *The Co-operator*. Many factors go together to determine the production rate of an open pit operation. Whatever other limitations exist, however, the loading shovel sets the initial capacity.

The ultimate in any operation would be a truck fleet keeping the shovel working 100% of the time with no hesitation in the rhythm of its swings and capable of meeting the exact required production. Generally speaking, the bigger the truck in com-

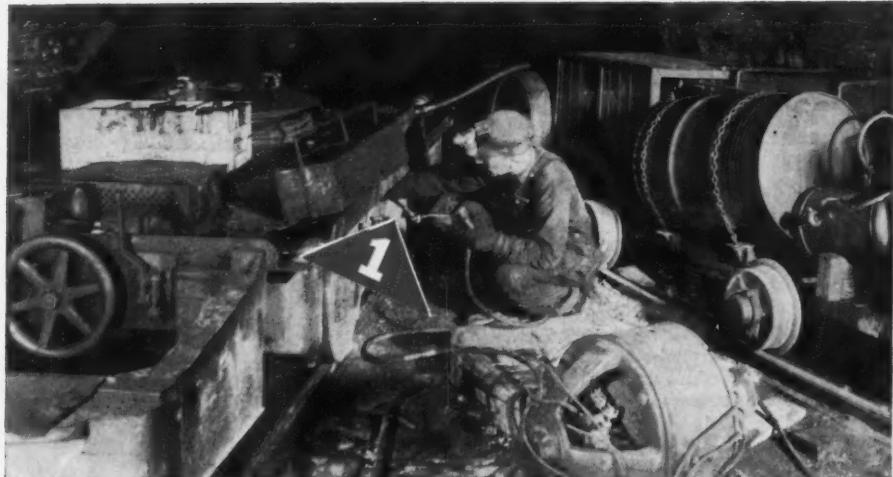
parison to the shovel, the more efficiently the shovel can be expected to work.

The accompanying chart illustrates the foregoing statement by comparing costs on a range of hauling cycles from 5 to 20 min for 10- to 32-ton trucks working with a 2-*yd* shovel. The chart may seem to be at odds with an old rule of thumb that four to eight dippers should load a truck. But the four-to-eight rule is essentially sound if interpreted as a maximum shovel size rather than a minimum. A shovel which loads a truck in less than four dippers may be abusing the truck even in free-flowing granular material. Less than eight dippers in hard, heavy poorly broken materials may also result in truck abuse and extra maintenance costs.

An operation should never hold truck size down for the sole objective of loading out with four to eight dippers instead of 10, 12 or 20. Efficiency is often increased and cost per yard decreased as the dippers required per truck load go up. This does not mean that a 2-*yd* shovel is more economical than a 4-*yd*, or a 4-*yd* more economical than an 8-*yd*. It means rather that the more dippers required of a 2-, 4- or 8-*yd* shovel to load a truck, the more efficiently the shovel works and more than likely the more economical the whole operations becomes.

The four-to-eight approximation does serve to keep from undersizing a truck. The limiting factors on how large a truck should be include loading heights, hopper and crusher sizes, haul lengths and grades to ensure an uninterrupted flow of units to the shovel, but not the dipper to body ratio. Basic management production planning will determine how large to go in truck size.

In summary, Mr. Brenkman says an operation in four to eight passes may be, under particular conditions, operating at maximum efficiency; however, an arbitrary sizing in this manner may also be costing money.



ESSO LUBES CUT COSTLY EQUIPMENT WEAR

1. NAKTA® Lubricants stay put in mine car wheel bearings even under the wettest conditions. Proved over many years and millions of miles of mine car wheel service.

2. NEBULA® EP multi-purpose grease is highly versatile... provides extreme-pressure and anti-wear qualities. Available in grades for both bearings and gears. Exceptionally resistant to water, oxidation, or thinning by heat. Reduces number of greases needed with their attendant costs of handling, storage and equipment investment.

3. AROX® EP Lubricants lower corrosion and wear in air powered equipment... 4 ways. (1) Guard against pounding wear with extreme-pressure agents; (2) Stick tightly to metal surfaces to ward off rust; (3) Minimize acid corrosion; (4) Atomize as desired in cold weather.

For further information on these and other special lubricants, contact your local Esso office or write: Esso Standard, Division of Humble Oil & Refining Company, 15 West 51st Street, New York 19, New York.



In Industry after Industry... "ESSO RESEARCH works wonders with oil"

Equipment Developments

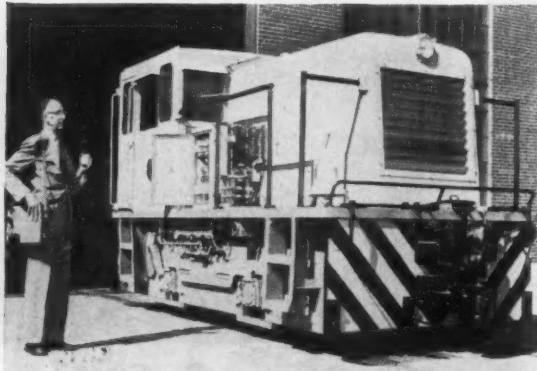
Giant Earthmover Strips

This Bucyrus-Erie Model 1054-WX wheel excavator at River King mine digs material on one side of the open coal pit and carries the dirt by its own conveyor system to the spoil area some 400 ft away. Weighing over 3 million pounds and standing 150 ft high, the excavator complements several other large Bucyrus-Erie machines including a 30-cu yd walking dragline, 12-cu yd electric loading shovel, and three rotary blasthole drills. Moving itself on four sets of hydraulically-leveled crawlers mounted at each corner of the base, this machine is powered by a number of electric motors. The digging wheel, 24 ft in diameter, is equipped with nine buckets which dig as the wheel rotates. Material is carried away by the 54-in-wide conveyor belt at



speeds in excess of 1,000 ft per min. Further information may be obtained by

writing Bucyrus-Erie Co., South Milwaukee, Wis.



Radio Controls Locomotive

General Electric's Locomotive and Car Equipment Dept., Erie, Pa., has recently demonstrated remote radio control of a 25-ton industrial diesel-electric locomotive including starting, stopping, sanding, reversing. Wireless communication is maintained between a portable transmitter, weighing less than 15 lb, and a receiver mounted on the locomotive. Powered by self-contained rechargeable batteries providing 8 hr continuous operation, the transmitter operates within a radius of $\frac{1}{4}$ mi emitting a continuous carrier. This maintains the "fail-safe" pilot relay in the receiver in the closed position thus forestalling emergency power and brake conditions on the locomotive. A "deadman" switch removes the carrier in case of operator failure. According to G. E., the new locomotive is ideal for short railroad switching and conforms to federal requirements.

Rear Dumpers for Mining

Two completely new rear dumpers designed to mining specifications and featuring mining-duty components were introduced by Mack Trucks, Inc. at the American Mining Congress Show in Las Vegas, Nev., Oct. 10-13. The M-45SX, a 45-ton, 6-wheel unit is powered by a V-12 diesel engine which develops 450-hp at 2,100 rpm, and its 7-in-dia tubular construction is designed to accommodate the heaviest loads of extra-heavy-duty dumper service, reports the company. Suspension consists of walking beam and flat leaf springs, which Mack claims results in superior ride characteristics. Long spring life and simplified spring replacement are special features. Incorporating many of the engineering and design features of its companion model pictured here, the M-30X, a 4-wheel vehicle, has a 6-cyl diesel engine which develops 320-hp at 2,100 rpm. Both models display a new offset cab which provides a commanding view fore and aft. Backbone of the new models are all-welded special alloy steel frames designed to withstand the most jarring impacts of huge shovel loads. For additional information on



both models and numerous optional features, write Mack Trucks, Inc., Plainfield, N. J.

There's no easier drill to run than a **REICHdrill!**



REICHdriller at control "console" has every rig maneuver in sight... every rig control in reach.

This smooth operating, all-hydraulic rotary rig is helping REICHdrillers get core samples faster.

In coring and prospecting there's no easier drill to run than a REICHdrill. And the key to money-making drilling records is a simplified control "console". From it, every move required by an experienced driller... every decision he makes... is converted smoothly, instantly, by the all-hydraulic system, into positive, time-saving performance.

Hydraulic drive to drill stem eliminates power loss... transmission troubles... kelly and rotary table.

Vari-speed Hydraulic Drill Control gives the operator the right combination of rotary speed and feed pressure for every formation. Lever actuated head retracts hydraulically for fast core recovery with wire-line equipment.

Other features: fast, easy set-ups; instant safety torque release to protect all drive components... save rotary and diamond bits, core barrels and drill steel. You get more from your rotary when it's a REICHdrill!

For further information write:


Division: CHICAGO PNEUMATIC TOOL CO. 

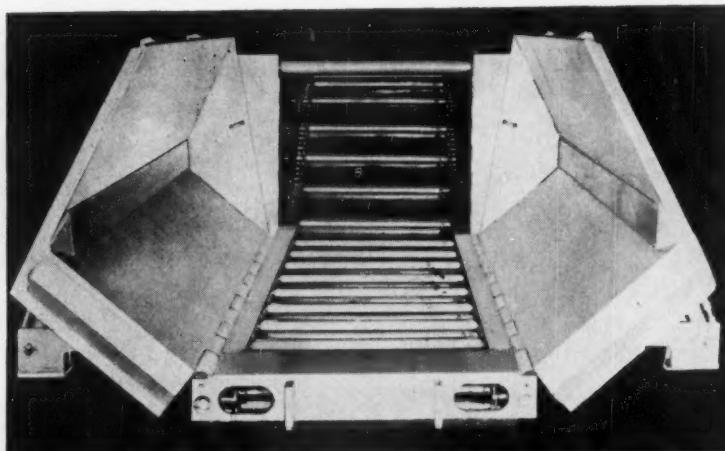


Model T-400 REICHdrill, specially designed for coring, has 12-foot continuous stroke. Down pressure to 10,000 pounds. Can drill up to 6" diameter holes, and take cores from more than 3,000 feet.

Equipment Developments (Continued)

Hydraulic Belt and Car Feeder

Developed as a means of accelerating shuttle car performance, the new TransFeeder belt and car feeder is announced by National Mine Service Co., Pittsburgh, Pa. With its hopper of 300-cu-ft capacity, the TransFeeder accepts the shuttle car's load at maximum discharge rate, then feeds it onto the belt or into a car at any desired rate. Sides of the new feeder raise to force the coal onto a center conveyor. Three models ranging from 44 to 58 in in height are available. As the shuttle car operator approaches the TransFeeder, he presses a button located on either rib, starting the cycle. Once the starter button is pressed, operation is completely automatic. With the conveyor operating, the shuttle car discharges its load at fastest possible speed and returns to the loader or continuous miner. Meanwhile, the feeder goes through this cycle: after a prede-



termined time (usually 45 sec) sides begin to raise hydraulically, directing coal onto the conveyor; after the sides have been fully raised for a selected time (usually 45 sec) the coal has been entirely conveyed to the belt or car; the

sides then return to the receiving position and the TransFeeder stops automatically, ready for the next loading cycle. The TransFeeder is balanced on the wheels to simplify moving with a shuttle car.



Long Range Electric Shovel

This Bucyrus-Erie Model 270-B electric shovel is working at Peabody Coal Co.'s River Queen mine near Central City, Ky. Designed with new control and front end flexibility to accommodate booms up to 100 ft long and dipper capacities from 8 to 18 cu yd, it incorporates new crawler mounting, revolving-frame and main-machinery advantages and offers a new elevated, full vision operator's compartment. A new variable static control system, employing magnetic amplifiers with no moving parts, is said to result in trouble-free, instant-response operation, unlimited no-load speed selection within speed range of system, constant load speed up to torque limit, control of drive speed and high available stalled bail pull in all operating points. Front end arrangement features new-type, one-piece boom, with wide boom foot, free of crowd machinery and new components include a snubber-equipped saddle block, screw-type crowd rope takeup, electric dipper trip, equalizer links at A-frame head for bridge strands and large crowd and retract rope sheaves mounted outside saddle block. For further details, write Bucyrus-Erie Co., South Milwaukee, Wis.



New Woven Carcass Belting

"Industrial Uniflo," a new woven-carcass rubber conveyor belt reported to withstand abuse far beyond conventional ply-type belting, was introduced last month at the 1960 American Mining Congress at Las Vegas, Nev., by Goodyear Tire & Rubber Co., Akron, Ohio. Especially adaptable to mining because of its capacity to be vulcanized into an endless unit in the field, the new belt is said to be the first woven carcass belt to successfully offer this capacity. Produced in continuous lengths without cover seams, Uniflo features a carcass of nylon reinforced cotton yarn woven into a special interlocking complex. Built-in impact resistance, excellent fastener holding qualities, outstanding troughing and tracking properties and better resistance to edge wear are among advantages of the new belting, according to Goodyear.



RED BITS



**cooler,
smoother
roof drilling
all the
way
in the
hole**



V-R Style DRF roof drill bits have been doing a tremendous job on Fletcher Roof Bolting Machines equipped with internal dust collectors. Benefits are . . .

- 1** Fines are minimized and pulled off faster.
- 2** Bits remain cooler all the way in the hole — lessens chance of bit burning up.
- 3** Faster penetration in all types of rock.
- 4** Reduction of power consumption up to 75%.

The DRF Red Bit performance is another result of V-R's 30 years' carbide research and manufacturing experience. Write for complete data on these and other V-R Bits or call your V-R man today!



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Just Like Money In the Bank . . .

Save 1/2-Hr. Per Shift Changing Bits On Mining Machines with **New, REVERSIBLE RATCHET BIT WRENCH**

Here's the wrench that gives you extra profits . . . your machines don't lose production waiting for bit changes. Reversible Ratchet Wrench changes direction of stroke instantly without re-

moval . . . works where side clearance is only $\frac{1}{2}$ ". One-piece, forged steel . . . box-end for "sledge-hammer jobs." Get extra time savings by keeping one on each machine.



Equipment News (Continued)

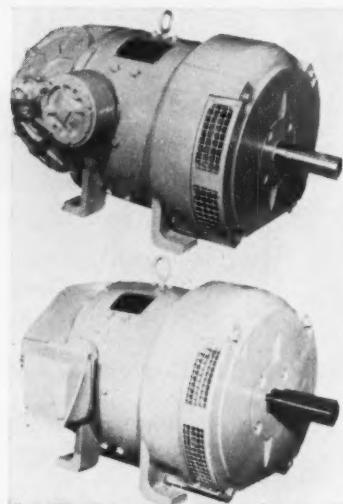


New Bits Reduce Idle Time of Continuous Miners

Two new coal cutting bits, designated the BR-3 and RB-3, are being marketed by Allegheny Ludlum Steel Corp.'s Carmet Div., Pittsburgh, Pa. A neoprene cylinder holds the bits in the cutting blocks or tool holders thus eliminating the need for set screws and saving considerable time in replacing worn bits, reports the company. They also note some coal producers claim bit changing time has been reduced up to 70% over the set screw system. Carmet is producing both bits with three grades of carbide cutting edge to meet individual cutting conditions. Special features include front or back removal—the RB-3 designed for back removal and the BR-3 for front removal, and a flat, square gage stop to prevent battering and wedging of bit blocks. The gages are made with additional shank support to eliminate splitting and mushrooming of blocks and give the shank extra strength. The bit is also available in the B-3 (fully opened faced carbide blank) and the RBR-3 (a cylindrical insert).

STEELS—Jones & Laughlin Steel Corp., Pittsburgh, Pa., have developed a new series of construction steels, "Jalloy-S," which are reported to combine very high

strength with ease of welding and forming. Three grades are available—"Jalloy S-90," "Jalloy-S-100" and "Jalloy-S-110." Grade numbers represent minimum yield strengths in thousands of pounds per square inch. A companion series of steels, "Jalloy-AR," said to set new performance levels for abrasion resistance at very high yield strengths, will be produced in two sets of hardness values, having a typical yield strength of about 140,000 psi.



Enclosed Motors and Generators

New totally enclosed DC motors and generators, designed for both constant speed drives and drives involving fast, wide speed changes and reversals, automatic control, or close regulation, are available from Westinghouse Electric Corp., Pittsburgh, Pa. The line features use of a high-temperature silicone insulation system for machines rated and built for continuous operation with a temperature rise of only 75°C and application of a new high-capacity system of controlled ventilation in which blow-

ers and heat exchanger are mounted at shaft end. The line includes totally-enclosed fan-cooled and non-ventilated machines in both industrial and explosion-proof construction. Motors are rated from $\frac{1}{2}$ to 60 hp at 300 to 3,500 rpm and generators from $\frac{1}{4}$ to 40 kw at 850 to 3,450 rpm. Principal advantages reported are faster response, stability and increased insulation life. Insulation life under all temperature conditions is ten times that of conventional Class B insulation and since the space gained by using silicone insulation is used for copper, heating within the machine is lessened and the total heat dissipation problem is moderated, says Westinghouse.



Electronic Tube Detects Fire

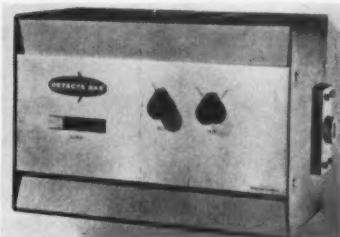
An electronic tube with two symmetrical electrodes capable of detecting fire by sensing its ultraviolet radiation and providing nearly instantaneous alarm, was announced by the Instrument Div. of Thomas A. Edison Industries, a McGraw-Edison Co., West Orange, N. J.

Equipment News (Continued)

Known as the "U-V Detector" and golf-ball size, the tube can be used as a communications device to detect gas and smoke and density of liquids or air, says the company. It is said to be operative within an ambient temperature range of -75 to +400 F. The U-V can be connected to a warning light, an audio alarm, arranged to activate controls, or any combination of the three. It will not respond to direct sunlight, normal illumination enclosed in glass, cosmic or nuclear radiation.



PUMPS—New line of "OJV and OMV" vertical split case pumps, with capacities to 6,000 gpm and heads to 380 ft, is announced by Aurora Pump Div., The New York Air Brake Co., Aurora, Ill. The case is split parallel with the impeller shaft with the suction and discharge flanges integral in the vertical base section. Other features include easily removable rotating unit, hydraulically and dynamically balanced double suction impellers and perfect bearing alignment according to Aurora.



MONITOR—Continuously and automatically the "Detectogas Monitor," developed by Detectogas Instruments, Inc., Houston, Tex., senses changes in air density due to gas infiltration and triggers any type of alarm system. Among

SCREENS THAT MAKE YOU MONEY

■ Your product has to be best . . . and so do your screens. Your present equipment can be equipped with Bee-Zee Screens, round-rod as shown above or in any of the special rod shapes shown below. Screens are all-stainless-steel and *all-welded*, with electronic control spacing the rods precisely. Find out how Bee-Zee Screens turn problems into profit—to make you money. Wire, write or phone Galesburg DIckens 2-5154 collect.

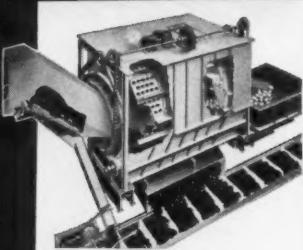
BIXBY-ZIMMER
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1110 Abingdon St., Galesburg, Ill.



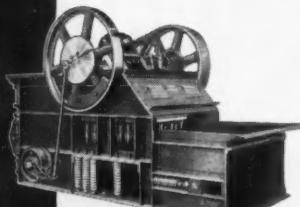
Bee-Zee Screens in a wide variety of shapes and sizes meet the needs of leading firms in the coal, minerals, quarry, oil, food, chemical, plastic, brewing, distilling, pulp and paper, rubber and other industries.

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CRUSHING EQUIPMENT**



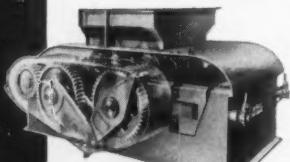
**McNally Pittsburg
Rotary Breaker**

This unit allows positive control of top size in handling run-of-mine washery feed. Production of fines is held to a minimum.



**McNally Norton Vertical
Pick Breaker**

50% Less fines when reducing lump to egg and stove sizes.



**McNally Double Roll
Gearmatic ROM Breaker**

Built in tonnage ranges from 750 tph to 1400 tph. Full floating gearmatic drive.



**McNally Gearmatic Steker
Coal Crusher**

This unit offers three prime advantages: high volume production, plus accurate sizing, plus low percentage of fines.

**Available From Stock and on Short Delivery
For immediate action on complete information write,
wire, or call**

McNALLY PITTSBURG MFG. CORP.

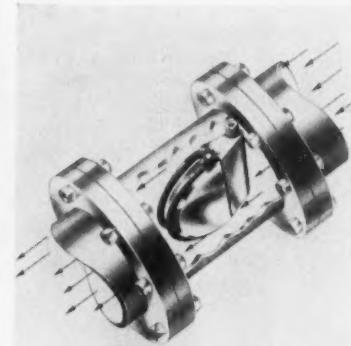
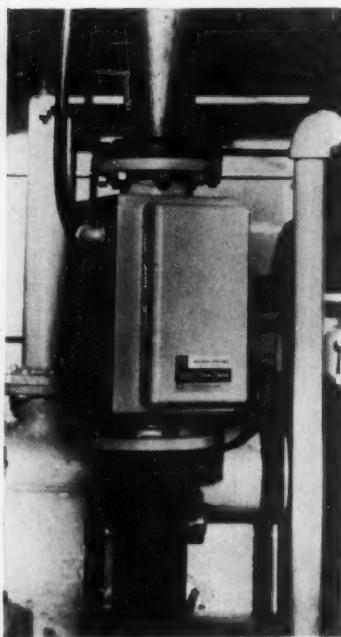
Pittsburg, Kansas

Wellston, Ohio

Equipment News (Continued)

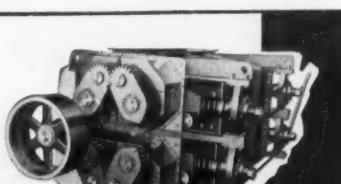
advantages reported are explosionproof operation, only periodic inspection maintenance required, no power needed for operation and no moving parts while monitoring.

age facility (Model 507), (3) the specific gravity of solutions and slurries in pipes or tanks (Model 504 pictured here), and (4) the percent moisture of liquids or slurries in a process loop or in a tank (Model 509).

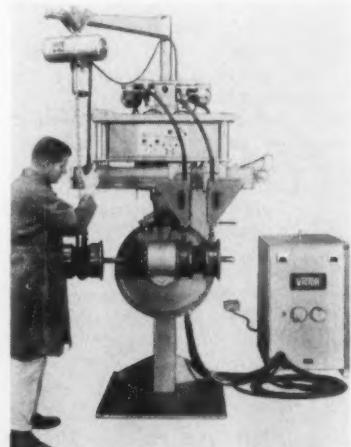


CHECK VALVE—“Technocheck,” offered by Techno Corp. of Erie, Pa., is said to work with maximum efficiency in air, gas, oil, water and other fluid lines, giving positive automatic opening and closing on low pressure differential. It employs the body of the valve in place of a valve seat, permits unrestricted straight-line flow and is silent. Designs are available with flanged, threaded or plain ends, etc. for special couplings. Standard valves are available for pressures up to 150 lb psi and 200 F and special valves, up to 300 psi and 500 F. Special designs can be made to meet specific conditions. Valve sizes are furnished from 1 to 36 in.

INSTRUMENTATION—Four new instrumentation systems for industrial processes have been developed by the Industrial Div. of Nuclear-Chicago Corp., Des Plaines, Ill. Named “Qualicon,” the four new systems provide measure and control of (1) the bulk density of solid materials either on a conveyor belt or in a bin or hopper (Model 502), (2) the percent moisture of solids materials on a belt or in a stor-

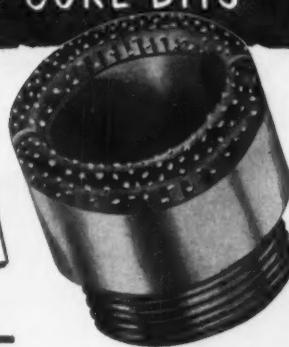


McNally Two Stage Crusher
This unit consists of a double roll primary crusher mounted above a double roll secondary crusher—compactly arranged into a single rigid structure.



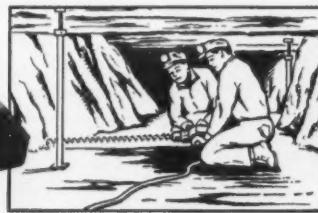
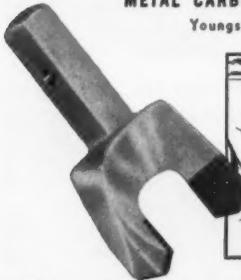
REBUILDING PARTS—For rebuilding rollers and idlers, an automatic machine made by Victor Equipment Co., San Francisco 7, is being marketed. This lower-cost machine, Model B, was developed to offer smooth uniform build up economically. It sells for less than larger Victor models, yet has the same double-wire feed, automatic move-over and mo-

SUPERSET CORE BITS



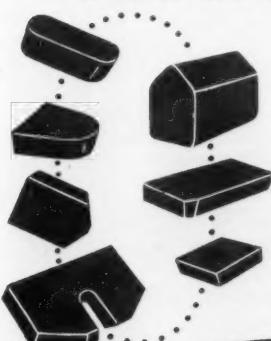
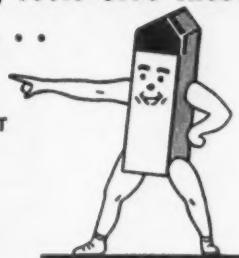
● Mining contractors, ore prospectors, coal operators and construction firms are realizing tremendous savings by taking advantage of our exclusive fabrication service! Contractors send us the necessary diamond stones from their own stocks—we hand set them in a super-hard tungsten carbide crown and braze to the threaded steel blank. Hand-set bits assure the proper positioning of each diamond stone to achieve maximum cutting efficiency. The carbide matrix holds the diamond stones until entirely used up. These advantages mean lower drilling costs to you. We can also supply complete core bits or salvage the stones from used bits at nominal cost. Supplied in standard sizes EX, EXE, AX, BX, NX, etc.

METAL CARBIDES CORPORATION
Youngstown 12, Ohio



Talide Tips for Mining Tools Give These 3 BIG ADVANTAGES . . .

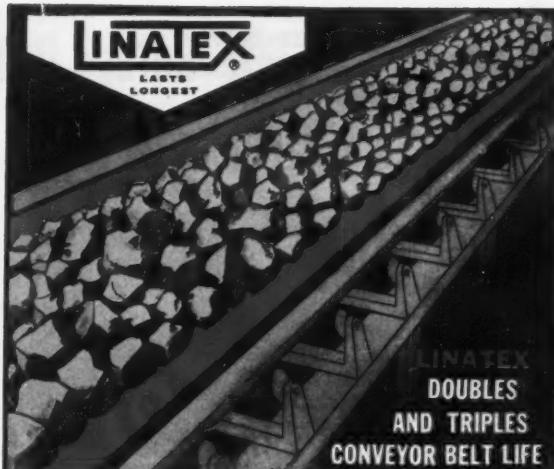
1. EXTRA STRONG
2. SUPER HARD
3. SHOCK RESISTANT



● A complete line of low-cost, high-quality Talide Tips is offered fabricators and users for tipping machine bits, rock bits, drill bits, roof bits and open-pit bits. All Talide Tips have a special surface finish that facilitates brazing. Non-standard shapes and sizes quoted on request.



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CONVEYOR BELT LIFE



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DAVEY Rotary Drills

...working partners of the coal industry



Davey Model M-8A Rotary Drill operated by Jim Tyger Drilling Co. of New Bethlehem, Pa., at Asco Mining Co., Knox, Pa.

For more economical, faster drilling and increased coal production, leading strip operators rely on Davey.

Suitable for either truck or tractor mounting, Davey Drills move fast between blast holes. They cut blasting costs, increase effectiveness of blasts and speed overburden removal.

Daveys are available in 8 models. Air blast, mud pump or combination types. Rated capacities to 3,500 ft. A-2000A

Write for Bulletin E-702S

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Portable Compressors

Auto-Air
Compressors

Tank-Mounted
Compressors



Air Tools



Stationary
Compressors



Rotary Drills

DAVEY COMPRESSOR CO.

Kent, Ohio

Equipment News (Continued)

torized positioning of work. It has a double spindle and mounts two rollers or idlers. A built-in jib crane and a rated $\frac{1}{4}$ ton capacity enables the operator to position rollers and large idlers with ease. Controls are centralized to save the operator movement.



STEEL REINFORCED TIRE—An armor-plated pneumatic industrial tire with two layers of steel cables under the tread, reported to be invulnerable to most types of industrial debris in $2\frac{1}{2}$ yrs of testing, is called the "Steel Protected Industrial Pneumatic" by its maker, the B. F. Goodrich Co., Akron, Ohio. Made with an all-purpose tread, the new tire is being produced in sizes to fit all popular materials handling equipment.



'61 TRUCKS—Chevrolet Motor Div., General Motors Corp., Detroit, Mich. is including in the 1961 line three new 4-wheel drive models with 127-in. wheelbase. The $\frac{1}{2}$ -ton vehicles are available as cab-chassis, wide- and conventional-box pickup models rated from 4,900 to 5,600 lb. gvw with 7.10x15-in. tires. Features on all 4-wheel drive units for 1961 include 10-in-dia clutch and standard 3-speed transmission. Among modi-

7th

Dravo 3200 towboat enters service... one more available for early delivery

The *Albert F. Holden*, newest Dravo-built 3200-horsepower towboat, has joined the fleet of Island Creek Fuel and Transportation Co., a subsidiary of Island Creek Coal Company, Huntington, W.Va. She is being used to push tows of coal on the Ohio River between the firm's terminals at Huntington and the Cincinnati and Pittsburgh areas.

Like all Dravo 3200's, the *Albert F. Holden* offers operating advantages made possible only by Dravo's *Precision-Balanced Propulsion*. In this system, all basic propulsion elements are designed and tested as a unit to give lowest ton-mile cost, resulting from greater push-power and better maneuverability. We'll be glad to supply facts and figures on how a Dravo 3200 can increase your towing efficiency and profits. Write or call Marine Department, Dravo Corporation, Pittsburgh 25, Pennsylvania; SPalding 1-1200.



DRAVO
CORPORATION



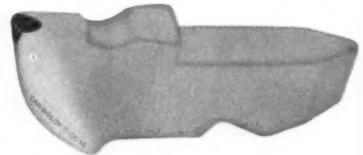
Bit illustrated: CC-12

MUSCLE.

In mining, muscle means money . . . and Carboloy[®] mining bits are mighty muscular. They bite out more coal tonnage per shift, are built to last longer, earn their keep a hundred ways.

Heard that story before? Probably more times than you can remember. But don't accept what we say as gospel truth — prove it for yourself! Try Carboloy mining bits in your operation. Try them and compare them. Watch your output-per-bit soar. See how the strength of the braze and the consistently high quality of Carboloy cemented carbides, plus the optimum physical properties of the shanks, all work together to give you the best return on your investment.

Your authorized Carboloy Mining Tool Distributor can supply you with the right Carboloy mining bit for every job. His name is on the next page. Check with him now! And take advantage of G-E's local engineering service. No obligation. *Metallurgical Products Department of General Electric Company, 11145 E. 8 Mile Street, Detroit 32, Michigan.*



CC-14 STYLE

Enclosed tip machine bit with stop on top — alternate design to CC-12 Style. Both available with on-top tip in styles shown below.

Full-radius neg-
ative rake
Specify
CC-12-B or CC-14-B



(CC-14-B SHOWN)

Full-radius tip —
5° positive rake
Specify
CC-12-A1 or CC-14-A1



(CC-12-A1 SHOWN)

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METALLURGICAL PRODUCTS DEPARTMENT

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Terre Haute—The Mine Supply Company, Inc.

KENTUCKY

Harlan—Kentucky Mine Supply Co., Inc.
Hazard—Speck Cornett Supply, Inc.
Madisonville—Pickard Industries, Inc., Central Mine Supply Div.
Pikeville—Big Sandy Electric & Supply Co.

OREGON

Portland—J. E. Haseltine & Company

PENNSYLVANIA

Charleroi—Mining Tool Service,
Lee Supply Co.
Washington—Fairmont Supply Company

TEXAS

El Paso—The Mine & Smelter Supply Co.

UTAH

Salt Lake City—The Mine & Smelter Supply Co.

VIRGINIA

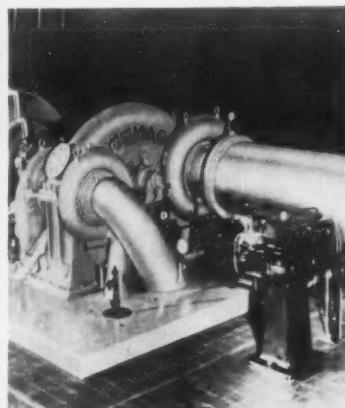
Andover—Central Supply Co., of Va., Inc.
McClure—Erwin Supply Company

WEST VIRGINIA

Bluefield—Bluefield Supply Co.
Bluefield—Fairmont Supply Company
Bluefield—Rish Equipment Company
Charleston—Rish Equipment Company
Clarksburg—Rish Equipment Company
Fairmont—Fairmont Supply Company
Montgomery—Marathon Coal Bit Company, Inc.
Shinnston—Erwin Supply Company

Equipment News (Continued)

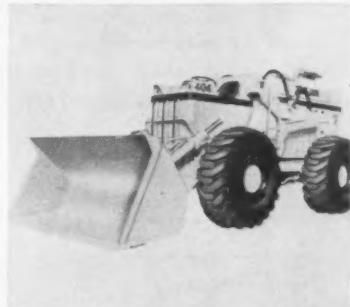
fications for the entire line are increased capacity torsion bars, new optional heavy-duty 12-leaf rear springs with ground capacity of 19,500 lb each for tandem axle models and redesigned 4-wheel drive lockout hubs.



AIR COMPRESSOR—A 4-stage integral gear centrifugal air compressor reported to be virtually vibration free, is offered by Worthington Corp., Harrison, N.J., in air-inlet capacities ranging from 4,000 to 30,000 cu ft per min and discharge pressures of 60 to 105 psig. The integral gear design allows direct coupling to a low speed motor driver which eliminates a high speed coupling and results in minimizing installation problems, states Worthington.



PUMPS—Fairbanks-Morse & Co., Pump & Hydraulic Div., Kansas City, Kan., has introduced a new line of "Adapt-Able" centrifugal pumps designed to furnish a wider range of clear water, non-clog and other liquid modifications. Featured innovation of this new line is the fact that each pump is NEMA-matched; that is, the pump dimensions align with those of NEMA rated motors for ease of mounting and trouble-free operation. The "Adapt-Ables" are built so that the pump frames receive various size volutes and impellers. Thus, each individual pump becomes, in effect, the equivalent of several individual units. Besides versatility, the F-M pumps offer other advantages.



TRACTOR SHOVELS—Two new additions have been added to the Trojan line of tractor shovels of The Yale & Towne Mfg. Co., Batavia, N. Y. Model 254, with 15,000 lb lifting capacity and bucket sizes from 2 to 3 cu yd, features full power shift transmission, planetary axles, power steering and 4-wheel air-powered hydraulic brakes, 24 mph road speed, safety-curve lift arms, extra wide tread and longer wheelbase. Weighing approximately 24,500 lb with overall length of 20 ft and width (over axle hubs) of 8 ft 10 in, a 40-deg bucket tip back at ground level carry position is provided. A torque proportioning differential axle permits maximum utilization

of power, reports the company, and both gasoline and diesel operation is available through three engine options. Model 404, powered by either the General Motors 8V71 with 264 hp or the Cummins NH 250 developing 250 hp, has been improved, notes Yale & Towne, by new engine options with greater horsepower, longer wheelbase, newly designed filtered hydraulic system incorporating an advanced type low heat generating pump, new main boom hydraulic lift cylinders with longer lived packing, armored 3-wire hydraulic hoses, and increased tire options.

(continued on p. 158)

144,292

IN ELEVEN MONTHS

This big McCarthy Auger mined 144,292 tons in eleven months in east Kentucky. That's bigger tonnage than many 100-man underground operations produce. And it was done with a two-man drilling crew!

Two big facts loom large in tonnage like this:

RUGGED CONSTRUCTION AND OUTSTANDING DESIGN which hold downtime to a minimum...

HYDRAULIC JACKS AND SKIDS which move the auger from hole to hole. No need to wait for the 'dozer.

The only time drilling slowed up was when haulage roads became impassable. The big drill works under almost "swamped" pit conditions. Pits can be as narrow as 30 feet. Highwalls can curve in or out. Coal of any density can be drilled with ease. Recovery rate is the best in the field!

If you'd like **FACTS** and **FIGURES** on the cost of augering, with a McCarthy, write directly to us or contact your nearest Salem distributor. Initial investment is less; pit-to-pit moves faster; set-up quicker. What's more... you can switch auger sizes at no added investment.

Add it up... augered coal costs less with a McCarthy!

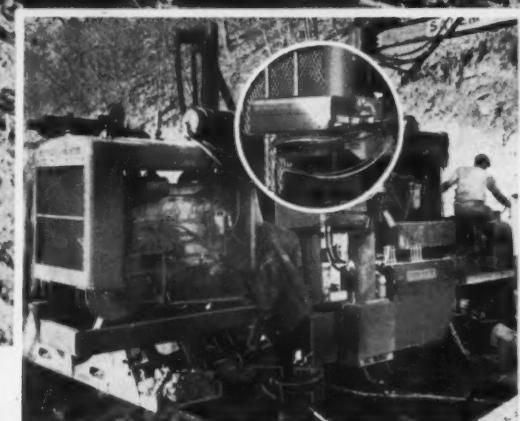
RUGGED AUGER works tight against the face. Operator can see entire highwall and observe rapid flow of coal. Only two-man crew required. 



SALEM

TOOL
COMPANY

763 SOUTH ELLSWORTH AVE. • SALEM, OHIO



POWER-LADEN diesel engine travels smoothly on cam rollers. Advance and return are fast. Side boom has hydraulic lift and swing. Drill has low center of gravity. (ABOVE)

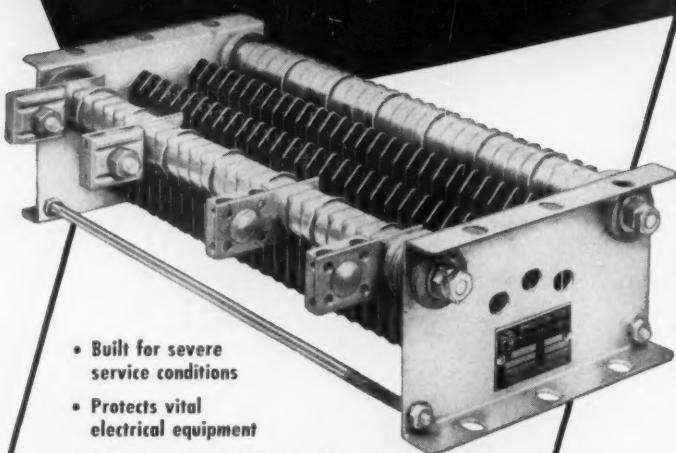
MODERN AUGER MINES utilize two-way radio. Big tonnages made possible by powerful McCarthys have boosted auger mining into big tonnage, high-profit class. (TOP RIGHT)

EXTENDED SKIDS smoothly position drill without 'dozer help even in sloppiest pits. Auger moves forward, back or to either side under own power. (RIGHT)



Steel Grid Resistor

plays an essential part
in the production of COAL...



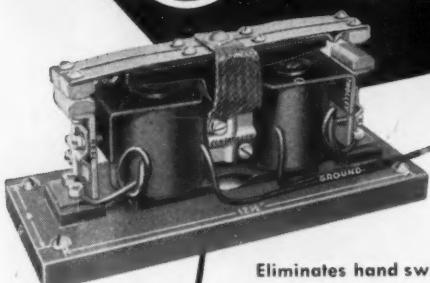
- Built for severe service conditions
- Protects vital electrical equipment
- Constant "trouble free" performance

These rugged nonbreakable units have proved their merit in all kinds of service for many years. Made of steel and mica, plus P-G unique and exclusive grid design, P-G Resistors are capable of protecting your most vital electrical equipment, even where service requirements are severe.

Designed to fit
your present
resistor space



AUTOMATIC Transfer Switch



Single or double
trolley and reel

Eliminates hand switches—entirely automatic. No shocks or burns to operator while changing from trolley to reel. Simple, safe, efficient, easy to install, can be mounted anywhere. For 250 to 600-volt service. Complete with cover.



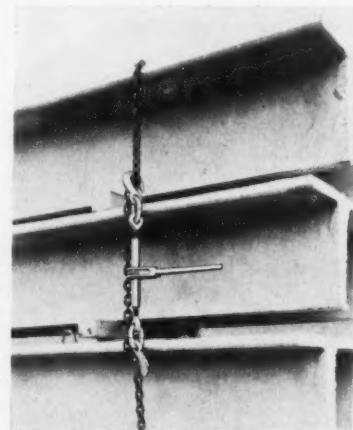
THE POST-GLOVER ELECTRIC COMPANY

OFFICE and FACTORY—Kenton Lands Road, Erlanger, Kentucky

MAILING ADDRESS—Box 709, Covington, Kentucky



HEADGEAR—Willson Products Div., Ray-O-Vac Co., Madison, Wis., has developed a new headgear known as "Tite Seal Headgear" that produces a complete air-tight seal with just two adjustments. Bureau of Mines approved, the headgear is available on airline respirators and Willson's complete line of standard and Scottoramic gas masks.



LOAD BINDER—Designed to "get the last half inch of chain" in takeup, this new ratchet type load binder is offered by the Crosby-Laughlin Div. of American Hoist & Derrick Co., Fort Wayne, Ind. Rigid one-piece construction with no bolts or nuts to loosen, a rustproofed ratchet spring, extra heavy barrel, forged alloy hooks and square threads are among features of the "Lebus Load Binder." Three models are available to fit chain sizes of $\frac{3}{8}$ -, $\frac{1}{2}$ - and $\frac{5}{8}$ -in. The R-7 model has an average breaking strength of 16,200 lb; the R-2, 26,000 lb and the R-C, 37,000 lb. All three models have an 8-in takeup.

CHUTES AND LINERS—Plastic chutes, liners and buckets for coal storage bins

Equipment News (Continued)



are being made by Abutco Plastics Industries Inc., Hazleton, Pa., from Fortiflex linear polyethylene produced by Celanese Polymer Co., a division of Celanese Corp. of America, New York, N. Y. In coal applications, principal advantages include toughness, complete resistance to corrosion and light weight, according to the companies. Chutes, liners and buckets are manufactured from extruded linear polyethylene sheets which are easily cut, bent or formed into the desired design.

Equipment Shorts

Hardening Compound — "Hard-N-Tuff" is a non-toxic steel hardening compound that carburizes, nitrides and chromizes in one operation, made by Hard-N-Tuff Corp., Huntington, N. Y. A single application on mild steel tools, dies and wearing parts provides a surface hardness of 60 to 65 Rockwell C, .003 to .006 in deep. Using standard heating equipment, parts are merely heated to red heat, plunged in the hardening compound, re-heated, then quenched.

Dust Filter-Metal Products Div.,

Koppers Co., Inc., Baltimore, Md., has designed and produced a new reverse-air jet dust filter, identified as "Model K Aeroturn." Employing cloth felt, the new filter features increased standardization and fewer component parts. A newly-designed blow-ring assembly features "low-rate" adjusting springs which provide maximum filter tube cleaning with minimum wear.

Steel Tape—Developed for heavy-duty and industrial use by Spencer Production & Sales, Pullman, Wash., the new Model 850 automatic 50-ft steel tape is marked in both feet and 16-in centers. Features include fast automatic rewinding and overriding clutch.

Welding—A new air-cooled push type welding gun, Model AH60-B, and wire feeder, Model AHF-D, for use with the gas-shielded metal-arc (Aircomatic) welding process, offered by Air Reduction Sales Co., New York, N. Y., is said to have particular value on applications requiring ruggedness, high duty cycle and an absolute minimum of downtime. The gun has a 60 deg goose-neck nozzle assembly and a level-type trigger. The wire feeder includes a remote speed control with 15 ft of service cord to provide wire feed speed adjustment up to 600 in per min near the work and operates on 115 V, 60-cycle, AC.

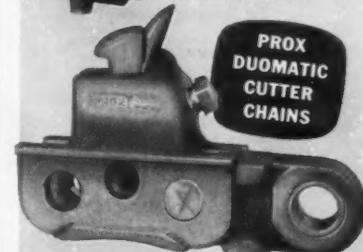
De-Icer—An electric radiant heater by Radcor, Inc., Bradner, Ohio, is reported to clear railway hopper car bottoms of snow, ice and frozen residue in a matter of minutes, thereby completely emptying the car for a full payload. Used in pairs, the heaters are placed between the rails so as to be directly under the cars. Each unit, designated RUC-32, has a maximum capacity of 32 kw, 240 V, 3-phase, contains 16 alloy-sheath Chromalox heating elements having threaded-end, waterproof fittings and is equipped with a 10-ft neoprene electrical connecting cable. Dimensions are 44x22-in, and framework is made of aluminized steel.

PROX SETS A NEW STANDARD FOR PRODUCTION WITH

THE STURDIEST CUTTER BAR EVER MADE

HEAT-TREATED, HIGHEST GRADE ALLOYS, WELDED FOR GREATER STRENGTH

Prox Cutter Bars are engineered for extra-long service, quick and easy maintenance, added safety. All parts that are subject to wear, are easily and economically replaced for continual, like-new performance. This means less down time, increased savings, higher profits. Prox Cutter Bars are versatile, too, designed to accommodate three cutter heads—roller, semi-circle and semi-circle shoe types. No matter whose mining machinery you're using, there is a Prox Cutter Bar to fit it. Why not check and see?



Made for Prox Tool Steel throwaway bits or conventional $\frac{1}{4}$ " x 1". All chain parts made from alloy steels, heat treated for maximum physical performance, all block and connectors drop forged, bushings hardened and ground. Prox chains are made in many thicknesses to fit nearly every type of cutting machine and cutter bar. Get the best—get Prox!

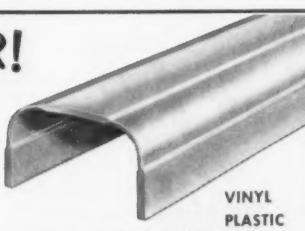
Investigate the complete line of Prox cutting equipment.

PROX
FRANK PROX COMPANY, INC.
TERRE HAUTE, INDIANA

Write for the name of your nearest Prox Sales Representative for complete information.

BRIGHT Yellow COLOR!

Guyan
VISI-GARD

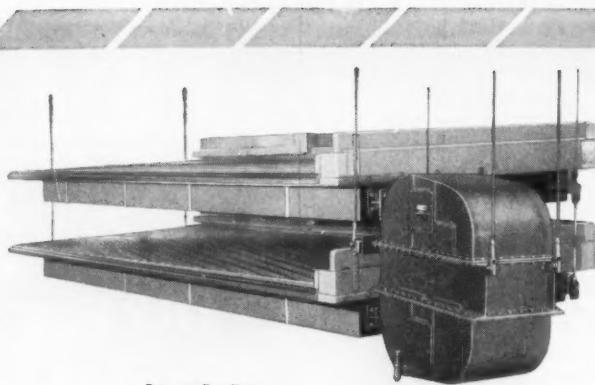


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PLASTIC
Will Not Support Flame

The Trolley Guard with BUILT-IN Safety!

SHAPED RIGHT TO HANG RIGHT. Write for literature.

GUYAN MACHINERY CO. LOGAN, WEST VIRGINIA



Patents Pending

No Need to Enlarge Your Plant for Doubling Capacity— We Expanded Ours!

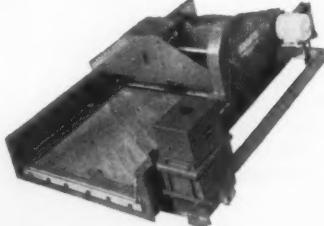
The demand for our space-saving, capacity-doubling CONCENCO® "77" coal washing table has been so heavy that we had to enlarge our plant after showing the industry how this twin deck innovation eliminates or long postpones new plant construction.

Quite a strange twist where the equipment manufacturer's—not the user's—expansion of plant structure comes with a doubling of the user's productive capacity. Not a paradox at all! We are happy that the potential and wide acceptance of the "77" table left the building structure problem with us.

If you do not employ this production doubling device now, better send for full information. Just ask for Bulletin 77.

For Screening Economy

All New Model Lenhy® screens utilize proven differential vibration that snaps oversize wedging particles loose 1600 times per minute. When dust is a problem, finally enclosed models prove their effectiveness. For dry screening, Flex-Elex® electric heating of the screen jacket insures full-time open mesh. For efficient wet screening CONCENCO spray nozzle arrangements are your answer.



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COMPANY

CONCENCO
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Equipment News (Continued)

Free Bulletins

Valve—Bulletin 204, available from Dept. PD, American Air Filter Co., Inc., 215 Central Ave., Louisville 8, Ky., describes its Illinois dual-purpose hot water balancing valve.

Filter Assemblies—Over 225 items of 20 basic types of standard woven wire mesh element-in-line filters are described in complete data sheets offered by Aircraft Porous Media, Inc., a sub. of Pall Corp., 30 Sea Cliff Ave., Glen Cove, N. Y.

Blasting—An illustrated 72-p pocket-size catalog and manual describes Primacord Detonating Fuse. Text covers use of detonating fuse in mining, stripping and other work. Write Sales Dept., The Ensign-Bickford Co., Simsbury, Conn.

Speed Drives—General Electric Co., Schenectady 5, N. Y., has published a two color, 16-p Bulletin CEA-6806 on their new $\frac{1}{4}$ - to 25-hp line of Polydyne mechanical adjustable speed drives.

Level Controls—A 6-p bulletin can be obtained from the Adv. Dept. of Weighing & Controls, Inc., Industrial Park, Hatboro, Pa., describing the company's complete line of Prob-A-Larm capacitance level controls.

Flotation—New Bulletin F5-B37 covering the principle and use of fine coal flotation cells and featuring flowsheets and results when treating plant overflow and plant black water is offered by WEMCO, Div. of Western Machinery Co., Sales Prom. Dept., 650 Fifth St., San Francisco 7, Calif.

Dragline Bucket—Page Engineering Co., Clearing P. O., Chicago 38, Ill., has announced release of Brochure DH-360 covering their new "Dual-Hitch Automatic" dragline bucket.

Truck Cost Records—To assist truck users in evaluating equipment performance, the Consumer Relations Dept., International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill., offers truck cost record books, Form AD-20, and driver daily reports, Form AD-26.

Car Handling—Various systems of handling railroad cars for loading material such as coal, etc. are discussed in Bulletin 760 by McNally Pittsburg Mfg. Corp., Pittsburg, Kan.

Car Shaker—Link-Belt Co.'s new one man operated Railroad Car Shaker is the subject of Folder 2745, "Car Shaker." Write to Dept. PR, Link Belt Co., Prudential Plaza, Chicago 1, Ill.

Among the Manufacturers

Kenneth H. Colville Jr. has been appointed to the new post of director of sales and marketing of the Hendrick Mfg. Co., Carbon-dale, Pa. He will be charged with the basic advertising and marketing strategy involved in the sales of Hendrick perforated metal, perforated metal screens,



Colville

Wedge Slot screens, Hendrick Wedge Wire screens, architectural grills, Mitco open steel flooring, Shur-Site treads, Armogrids and Hydro Dehazers. Mr. Colville joined Hendrick in 1940 and was elected secretary and named a member of the board of directors in 1953.

William A. Cooper has been named to the newly-created post of manager of distributor sales for Goodyear Tire & Rubber Co.'s Industrial Products division in Akron, Ohio. Joining Goodyear in 1936 as stock clerk in St. Louis, he became assistant industrial products clerk early in 1940



Cooper

and later that year was transferred to Minneapolis as industrial products clerk. From 1946 to 1955, while employed as assistant district manager in New York, Mr. Cooper served as a field representative in Johnstown, Pa., Knoxville and Detroit, and since 1957 served as district manager in Charlotte, N. C.

Edward T. McNally, chairman of the board of McNally-Pittsburg International, Inc., Pittsburg, Kan., accompanied by Mr. William L. Stewart, secretary, has left for a round-the-world trip which will include a visit to Dugda, site of the multi-million dollar coal preparation plant McNally-



McNally

Pittsburg is building for the Indian government as part of the second 5-year plan. While there, Mr. McNally will confer with officials of the Hindustan Steel Pty. on construction of other preparation plants to be built in 1962 under the third 5-year plan. Another stop will be near Tuncbilek in Turkey to

check progress on the third McNally-built preparation plant in that country. Robert C. Woodhead, president of McNally Pittsburg International, Inc., and C. H. Lewis, McNally Pittsburg design engineer, joined Messrs. McNally and Stewart to check progress on the Dugda plant.

Walter F. Strehlow was named senior consulting engineer for the Tractor Group of Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Joseph Leighton, formerly mining tool engineer with the Metallurgical Products Dept. since 1951, has been appointed district manager, Mining Tool Sales, General Electric Co., Metallurgical Products Dept., Detroit, Mich.

G. Walter Tench has been appointed manager of distributor and jobber sales for Cross Perforated Metals, Reynolds Div., National-Standard Co., Carbondale, Pa.

Link-Belt Co., Chicago, Ill. has announced general managers for three of its plants. T. Webster Matchett, former manager of the Caldwell plant in Chicago, has been appointed general manager of the Pershing Road plant in that city. He is succeeded at the Caldwell plant by George Ramsden, general manager of the North Central Div. in Minneapolis. Mr. Ramsden is succeeded in Minneapolis by Gerald A. Stone, district manager of the Dallas office and factory branch store.

George R. Fox has been elected vice president of manufacturing, Joy International, S. A., wholly-owned subsidiary of Joy Mfg. Co., Pittsburgh, Pa.

E. F. Grewe has been named manager of the newly consolidated centrifugal pump department and compressor department of Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Linatex Corp. of America, Stafford Springs, Conn., has announced a major increase in sales force and coverage in U. S. Eric Lof and A. R. Beatty are now regional sales managers for the Middle West and Western States, respectively. Walbridge Co., Denver, Colo., has been appointed an area representative in Colorado, Wyoming and Utah to handle Linatex linings, pumps and valves, with Cecil Walbridge covering sales and services.

Lloyd A. Rager has been appointed manager of the newly established Products Marketing Dept. of LeTourneau-

Westinghouse Co., Peoria, Ill. Formerly product manager of the Motor Grader Div., Mr. Rager has been associated with the firm since 1936.

P. T. Bloodsworth has been named eastern sales manager for Kaiser Steel Corp., Oakland, Calif. and will head the company's sales office at 300 Park Ave., New York City. He has been with the New York sales office since 1955, serving first in general sales, then as tubular products sales representative and in Dec. 1958 was named a district sales representative for all Kaiser Steel products.

A. M. Lowrey was promoted to assistant industrial sales manager, Thermoid Div., H. K. Porter Co., Inc., Pittsburgh, Pa. Formerly eastern regional sales manager for Thermoid since 1959, he will make his headquarters in Trenton, N. J. Mr. Lowrey joined the Quaker Rubber Co. in 1941 prior to its incorporation into H. K. Porter Co., Inc. and was named Philadelphia district manager in 1950.

Earl D. Weaver has been appointed plant manager of Cross Perforated Metals Plant of National-Standard Co.'s Reynolds Div. Mr. Weaver joined National-Standard in 1955 as a project engineer in the firm's Niles, Mich., plant and was transferred to Cross in Dec. 1958 as chief engineer.

Gordon F. Rogers was appointed to the newly-created post of manager of advanced development for RCA communications equipment at the company's David Sarnoff Research Center at Princeton, N. J.

F. W. Bloecher Jr. has been chosen assistant manager of the mining chemicals department of Cyanamid International, a division of American Cyanamid Co., New York City. He joined Cyanamid as a research engineer in mining chemicals in 1951 and was appointed sales engineer for the company's Mineral Dressing Div. a year later. In Jan., 1959, he assumed a similar position with Cyanamid International.

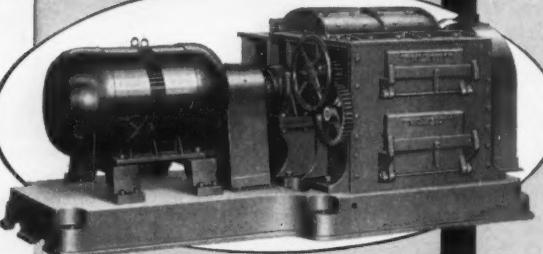
West W. Callender assumed the duties of mine roof bolt product manager in addition to his responsibilities of product manager, rail and trackwork, at the H. K. Porter Co., Inc. plant in Huntington, W. Va.

Obituary

Andrew Rostosky Jr., sales representative for U. S. Rubber Co., Johnstown, Pa., was killed in an automobile accident Aug. 4. The son of a coal miner employed by the Pittsburgh Coal Co., Mr. Rostosky was awarded one of the company's scholarships to Pennsylvania

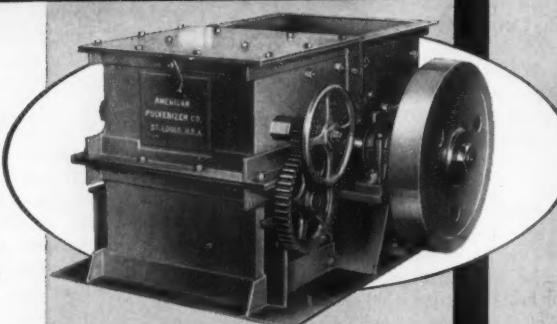
When You Figure . . .

AC Series
capacities to
800 TPH



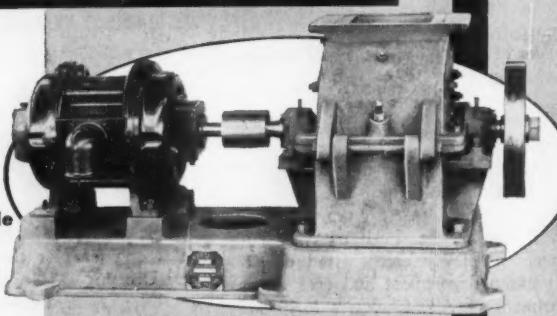
**Reduction
Cost Per Ton . . .**

WC Series
capacities to
90 TPH



the Best Answers* . . .

**Coal Sample
Crushers**
capacities to
2000 Lbs.
Per Hr.



**Come from American
Ring Coal Crushers**

*In a recent independent survey, it was found that American Crushers reduced over 61,000,000 tons of coal at a parts replacement cost (including standby parts) of less than 1/10th of 1¢ per ton.

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State University from which he graduated cum laude with a degree in mining engineering. He began his career with Pittsburgh Coal Co. and some 8 yr later went into business for himself, prior to joining U. S. Rubber Co.

Company Briefs

Burndy Corp. of Norwalk, Conn. and Ingeneria Electrica Industrial, S. A., have announced formation of a jointly owned Mexican corporation, Burndy I.E.I. de Mexico S. A.

Ohio Brass Co., Mansfield, Ohio, has entered an agreement to acquire all assets of Timpte Bros., Inc., Denver, Colo.

Alpha-Molykote Corp., Stamford, Conn., has established a branch office and technical service center at 2645 W. Peterson Ave., Chicago. R. B. Dost has been named Midwest district manager.

American Biltite Rubber Co., Inc., Boston Woven Hose & Rubber Div., Boston, Mass. has appointed Te-Co, Inc., St. Louis, Mo., warehousing distributor.

Simplex Wire & Cable Co., Cambridge, Mass., and Hitemp Wires, Inc., Westbury, N. Y., have approved the merger of Hitemp into Simplex. After the merger, Hitemp will operate as The Hitemp Wire Co., a division of Simplex, with George F. Rolfe continuing as president and general manager.

Crucible Steel Co. of America, Pittsburgh, Pa., through its wholly owned subsidiary, World Crucible Ltd., has purchased 75% ownership of the Fonderie Acciaierie Milanesi Vanzetti, S. p. A. of Milan, Italy. Vanzetti will continue to operate with its present management and employees under the name of Acciaierie Crucible Vanzetti, S. p. A.

Multi-Amp Electronic Corp., Union, N. J., has recently appointed Burns Electric Co., Pittsburgh, Pa., a representative for western Pennsylvania and northern West Virginia.

Harnischfeger Corp., Milwaukee, Wis. has appointed Embry Tractor & Supply Co., Inc., Louisville, Ky., dealer for P&H construction and mining equipment.

Western Machinery Co., Inc., Abilene, Texas, has been appointed distributor in the Texas Panhandle area for Koehring and Parsons Divs. of Koehring Co.

Hewitt-Robins Incorporated, Stamford, Conn., on Oct. 4 consummated the acquisition of the assets of the Union Chain and Mfg. Co. for 51,250 shares of Hewitt-Robins common stock. E. F. Emmons, former president of Union Chain, will be president of the Union Chain Div. of Hewitt-Robins.

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COAL AGE published monthly at Philadelphia, Pennsylvania for October 1, 1960.

1. The names and addresses of the publisher, editor, managing editor and business managers are: Published by McGraw-Hill Publishing Company, Inc., 330 West 42nd St., New York 36, N.Y.; President, George T. Willard; Vice President, Donald C. McGraw; Secretary, Harold Davis; 330 West 42nd St., New York 36, N.Y.; Business manager, John Tsivoulis, 330 West 42nd St., New York 36, N.Y. McGraw-Hill Publishing Company, Inc., 330 West 42nd St., New York 36, N.Y. Stockholders holding 1% or more of stock are: Donald C. McGraw & Willard T. Chevalier, Trustees under Indenture of Trust m/b James H. McGraw, dated 1/14/21 as modified; Donald C. McGraw, Trustee under Indenture of Trust m/b James H. McGraw, dated 7/1/37 as amended; Donald C. McGraw, individually; Estate of Mildred W. McGraw; Donald C. McGraw and Catharine McGraw Rock, Executives; (all of 330 West 42nd Street, New York 36, N.Y.) and the McGraw-Hill Educational Fund, Inc., 63 Wall St., New York, N.Y.; Genesee & Co., P.O. Box 491, Church St., Station, New York 10007; Touchstone & Co., c/o Wellington Fund, Inc., Clayton, Delaware.

2. The names and addresses of the publishers, and other security holders owning or holding one percent or more of total amount of bonds, mortgages, or other securities are: None.

3. Paragraphs 2 and 3 include, in cases where the stockholders, publishers, or other security holders of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the true condition and position under which stockholders and security holders who do not appear in the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

4. The average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: 14,324.

McGRAW-HILL PUBLISHING COMPANY, INC.

By John J. Cooke, Secretary
Sworn to and subscribed before me this 15th day of September, 1960.

JANET A. HARTWICK
(My commission expires March 30, 1961)

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(Classified Advertising)

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USED OR RESALE

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Advertisers Will
Have Special Value . . .

— for you—the advertiser—and
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advertisers mean more informa-
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Classified Adv. Div. of this publication.

Send to office nearest you.

NEW YORK 36: P. O. Box 12

CHICAGO 11: 520 N. Michigan Ave.

SAN FRANCISCO 4: 68 Post St.

POSITION VACANT

Old Ben Coal Corporation requires two graduate
engineers under age 30 for work in Industrial
Engineering Department. Location Southern Illinois.
Send complete resume including earnings to
W. C. Campbell, 360 W. Jackson Blvd., Chicago.

POSITION WANTED

Well experienced General mine Foreman, or
Superintendent, age 37 seeks new connection
or correspondence invited with either operation or
consultant. Will go to any State. PW-5589,
Coal Age.

ELECTRIC AND MACHINE SUPPLY COMPANY

Largest Supplier of the Best Rebuilt Mining Equipment

CONTINUOUS MINERS

1-3 JCM Joy Continuous Miner, 250 V., D.C., Excellent Condition
1-Lee Norse Jr. Continuous Miner, 250 V., D.C.

CUTTING MACHINES

6-12RU Joy Cutting Machines, 250 V. D.C., Permissible, Dual Wheels, Bug Dusters, 9' Bar, Excellent Condition
5-11RU Joy Cutting Machines, 250 V. D.C., Permissible, Bug Dusters, one completely rebuilt
1-70 URB Jeffrey Cutting Machine, 250 V., D.C., Excellent Condition
1-29U Jeffrey Cutting Machine, 220/440 V.A.C. completely rebuilt
15-12 Goodman Cutting Machines, 250 V. D.C., Hydraulically or Manually Controlled
1-824 Goodman Slabber, 250 V. D.C.
50-358 Jeffrey Cutting Machines, A.C. and D.C.
1-35L Cutting Machine
6-7AU Sullivan Cutting Machines, 250 V. D.C.
5-7B Sullivan Cutting Machines, 250 V. D.C.
16-11B Sullivan Cutting Machines, 35 & 50 h.p., 250 V. D.C.
19-12AB, 12AA and 112AA Goodman Cutting Machines, 250 V. D.C.
9-212AA Baby Goodman Cutting Machines, 250 V. D.C.

BELT CONVEYORS

1-36" Joy Model "C" Belt Conveyor, 1,080' centers
7-MTB 30 Joy Tandem Belt Conveyors, 1,000' centers, 25, 40 & 50 h.p., one with Scandura Flame Proof Belting
670'-48" Link Belt Conveyor Structure
1-30' 97HC Goodman Tandem Belt Conveyor Drive
5-99-56T Tandem Belt Conveyor Drives
1-30' Shop Constructed Belt Conveyor Drive
285'-30' Barber Greene Belt Conveyor Structure
8,760'-26" Joy Model "D" Structure
18-26" Belt Conveyor Drives, various makes

LOADING MACHINES

3-11BU Joy Loaders, 250 V. D.C.
5-8BU Joy Loaders, A.C. & D.C., rebuilt
2-14BU-7RAE Joy Loaders, 250 V. D.C.
1-14BU-7BE Joy Loader, 250 V. D.C.
6-14BU-3PE Joy Loaders, 250 V. D.C.
7-14BU-2E Joy Loaders, 250 V. D.C., 28" O.H.
3-12BU-9E Joy Loaders, 250 V. D.C., rebuilt
4-20BU Joy Loaders, 250 V. D.C., Permissible
1-360 Goodman Loader, on rubber, 250 V. D.C.
5-Lon 88 Pig Loaders, 250 V. D.C.
1-24BB Clarkson Loader, 250 V. D.C.

SHUTTLE CARS

8-60E-10 Joy Shuttle Cars, w/Elevators, matched pairs, 250 V. D.C.
10-12E Joy Shuttle Cars, 250 V. D.C.
5-5SC Joy Shuttle Cars, w/Elevators, 250 VDC
19-6SC Joy Shuttle Cars, matched pairs, 250 V. D.C.
2-8SC Joy Shuttle Cars, Elevating Discharge, Permissible Plates, Excellent Condition, 250 V. D.C.
17-32E-10 & 32E-16 Joy Shuttle Cars, Excellent Condition, 250 V. D.C.
2-MT66-A45 Jeffrey Shuttle Cars, 250 V. D.C., matched pair, Excellent Condition

MISCELLANEOUS TRACKLESS EQUIPMENT

1-WK-83R Joy Compressor, 240 cu. ft.
1-WL-82 Joy Compressor, 125 cu. ft.
7-T2-5AE & T2-2E Joy Machine Trucks
2-T1-4G Joy Machine Trucks, 220 V. A.C.
1-Lot 9J, 10J, 23 J & 24J Motors

PREPARATION EQUIPMENT

1-4 Cell Jeffrey Baum Jig Washer, complete, 300 t.p.h. capacity
1-Simon Carver Heavy Duty 2 compartment Baum Jig, 400 t.p.h. capacity

We have thousands of dollars worth of parts for the equipment listed.

ALL INQUIRIES WILL BE ANSWERED PROMPTLY

WHITESBURG, KENTUCKY
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HANK UBBING
GORDON STAFFORD

1-Daniels Heavy Media Washer
1-48" CMI Centrifugal Dryer
1-Heat Dryer, complete
1-36" x 130' Hot Material Handline Belt, Excellent
4-7" x 15' Single Deck Duster Tables
1-36" x 36" Jeffrey Single Roll Crusher
1-36" x 33" Marion Double Roll Primary Crusher
1-30" x 36" Jeffrey Double Roll Crusher, Like New
1-30" x 30" Link Belt Double Roll Crusher
1-24" x 50" Pa. Single Roll Crusher
2-24" x 24" Jeffrey Single Roll Crushers
1-2" x 4' Williams Pulverizer
1-18" x 24" McClanahan & Stone Single Roll Crusher
1-18" x 12" Jeffrey Swing Hammer Pulverizer
1-6" x 16" Allis Chalmers Double Deck Low Head Vibrator
1-6" x 14" Single Deck Allis Chalmers Low Head Vibrator, Like New
1-5" x 16" Triple Deck Allis Chalmers Ripl-Flo Vibrator, Like New
1-5" x 16" Single Deck Allis Chalmers Low Head Vibrator, Like New
2-5" x 12" Allis Chalmers Single Deck Low Head Vibrators
1-5" x 12" Allis Chalmers Ripl-Flo Double Deck Vibrator
1-3" x 14" Single Deck Gyro Vibrator
2-3" x 8" Low Head Vibrators
1-30" x 72" Jeffrey Taylor Doubt' Deck Vibrator
1-2" x 5" Lecco Single Deck Vibrator
1-2" x 5" Electro Double Deck Vibrator
9-24" x 90" Jeffrey Taylor Vibrators, w/M.G. Sets
2-Magnetic Separators, Complete
1-Set Jeffrey Dewatering Screens
13-Scraper Conveyors of various sizes
14-Dray Conveyors of various sizes
1-970' Jeffrey Rope & Button Conveyor
13-Boom Hoists from 1 ton to 5 ton
We can construct loading booms and trolley belts in any size.

CHAIN AND SHAKER CONVEYORS

20' Joy Chain Conveyors, A.C. & D.C., Permissible
15' Chain Conveyor Drives, A.C. & D.C., Permissible
15' Long Chain Conveyors, A.C. & D.C.
12' & 15' Jeffrey Chain Conveyors
12' Goodman Chain Conveyors
PT12 Long Piggyback Conveyors
Goodman G121/2, G15 & G20 Shaker Conveyor Drive
Joy Ladel UNI Shaker Conveyor Drives
Goodman Power Duckbill & Duckbill Hoists

LOCOMOTIVES

4-20 Ton Jeffrey MH77 Locomotives, 42" & 48" t.g.
1-15 Ton HM828 G.E. Locomotive, 90 h.p. units, 44" O.H., 48" t.g., Excellent
1-14 Ton MH110 Jeffrey, 42" t.g.
1-13 Ton Locomotives, 250 V., any gauge
1-12 Ton 29B Goodman Locomotive, 40" O.H.
11-10 Ton Locomotives, 250 V., any gauge
19-8 Ton Locomotives, 250 V., any gauge
8-7 Ton Atlas Battery Locomotives
29-6 Ton Locomotives, any gauge
3-6 Ton Jeffrey MH150 Locomotives
16-6 Ton MH88 Jeffrey Locomotives
9-5 Ton Locomotives, 250 V.
17-4 Ton Locomotives, 250 V., any gauge
1-4 Ton G.E. Battery Locomotive, 48" t.g.
2-4 Ton Mancha Battery Locomotive, 48" t.g.

SUB STATIONS & TRANSFORMERS

1-Westinghouse A.C. Sub Station, 4500 KVA, 6900/2300, complete w/boards, Excellent
4-300KW M.G. Sets
5-200KW M.G. Sets
4-200KW, HCC-6-1200 G.E. Rotary Converters, Automatic

4-150KW G.E. Rotary Converters, w/Transformers
1-150KW Westinghouse Rotary Converter, Completely Automatic
19-150KW M.G. Sets of various makes and voltages
2-100KW M.G. Sets
1-100KW Westinghouse Generator, 250 V. D.C., connected to Buda Diesel Engine, complete w/boards
2-100 KW Generators, w/671 G.M. Diesel
1-100KW Generator w/UD1091 International Diesel
1-90KW Generator w/671 G.M. Diesel
1-75KW Generator w/1009 Diesel Engine
1-75KW Generator w/75 h.p. G.M. Diesel w/ITE Automatic Control Board
1-100KVA Gasoline Alternator Unit
1-50KW M.G. Set, 125 V. D.C., 1200 rpm
2-Armatures for 200KVA Rotary G.E., type HCC
2-600 & 800 Auto Transformers
19-Transformers from 1½KVA to 800KVA

MINE CARS

90-36" t.g. Drop Bottom Cars
155-42" t.g. End Dump Cars, various makes
176-42" t.g. S. D. Drop Bottom Mine Cars
45-42" t.g. A.C.F. Drop Bottom Cars
22-44" t.g. Drop Bottom Cars, 10 ton cap.
130-44" t.g. Drop Bottom Cars, various sizes
333-44" t.g. End Dump Cars, various sizes
327-48" t.g. S. D. Drop Bottom Cars
259-48" t.g. A.C.F. Drop Bottom Cars
2-56½" t.g. 3 Ton, 4 Wheel Push Trucks (NEW)

RAIL AND WIRE

1-455-Tons 40, 45, 56, 65, 70, 80, 90 & 100 lb. Rail
325-2,000,000 CM Bar Copper Feeder Cable
2,000-2/0 Solid Copper, Bare
27,600-1/0 Solid Copper Hipline Wire
7,725-#2 Solid Copper Hipline Wire
2,100-#2 Stranded Copper Hipline Wire
164,000-#2 Solid Copper Hipline Wire
2,380-#4 Solid Copper Hipline Wire
3,900-#6 Solid Copper Hipline Wire
5,000-#4/0 Fig. 8 Trolley Wire
42,333-#4/0, 3 Cond. rubber covered cable, 5,000 V. Excellent Condition
5,000-#2/0, 3 Cond. Anhydrex & Lead covered transmission cable
10,000-#2, 3 Cond. Lead Covered Cable, 5,000 V.
6,200-#1, 3 Cond. Lead Covered Cable, 5,000 V.
2,500-#1½" Steel Cable, New
600-#1½" Steel Cable, New
Several Thousand feet #2, #3 and #4 approved type machine cable

MISCELLANEOUS

1-Canton Track Cleaner, Excellent
18-HKL, HKG, HKD, HKC, HL & CH Brown Fayro & Sullivan Hoists
48-Air Compressors of various sizes
57-Auto Starters from 3 h.p. to 100 h.p.
81-Hoists from 1½ to 800 h.p.
13-Shop Constructed Jetty track mounted
115-Pumps from ¾" to 4500 GPM
7-Hyd. Schroeder Coal Drills
1-RBD30 C.P. Roof Drill
83-Coal Drills, various makes and sizes
1-330 GPM & Pomona Deep Well Pump
1-14" Centrifugal Shallow Pump
45-Room Blowers: Brown Fayro & Jeffrey
27-Mine Fans from 30" to 9' Hi Pressure
17-Battery Chargers, various voltages
11-Roof Dusters up to 30 h.p.
5-Phillips Machine & Shuttle Car Carriers, 30' to 48' Ls.
1-42 Ton Richards Truck Scale, 10' x 25' Deck
788-Stationary Motors—½ to 800 h.p., A.C. & D.C. (List of motors available upon request)

LOOKING FOR AN ECONOMICAL WAY TO MECHANIZE TO MEET TODAY'S RISING MINING COSTS?

Check our listing of modern mechanical equipment — whether to completely mechanize or further mechanize your operation — we offer the most complete stock of used and rebuilt machinery.

BUY — SELL — TRADE

A.C. MINING EQUIPMENT FOR SALE

- 2-12G-3 Goodman Cutting Machines, A.C.
- 2-11BU-10AAPH Joy Loading Machines, 220/440 Volts A.C.
- 2-4JCM Joy Continuous Miners, 440 Volts A.C.
- 3-7B Sullivan Cutting Machines, 220/440 Volts A.C.
- 1-T-1 Joy Machine Truck, A.C.
- 1-T-2-5 Joy Machine Truck, A.C.

LOADING MACHINES FOR SALE

- 1-18 HR Joy Loading Machine, 250 Volts D.C.
- 4-11 BU-10APE Joy Loading Machines, 250 Volts D.C.
- 1-14 BU-7BE Joy Loading Machine, 250 Volts D.C.
- 1-14 BU-3PE Joy Loading Machines, 250 Volts D.C.
- 6-12 BU-9E Joy Loading Machines, 250 Volts D.C.
- 4-8 BU Joy Loading Machines, 250 Volts D.C.
- 3-7 BU Joy Loading Machines, 250 Volts D.C.
- 2-Long 12' Piggyback Conveyors, each 300' long, complete with PT-12 Piggybacks and 12BU Joy Loading Machines.
- 2-14BU-7RBE Joy Loading Machines, 250 Volts D.C., excellent condition.

SHUTTLE CARS FOR SALE

- 2-32E-16 Joy Shuttle Cars, 250 Volts D.C.
- 1-570-48 Goodman Shuttle Car, 250 Volts, D.C.
- 1-SSC Joy Shuttle Car, Elevating Discharge, Disc Brakes, 250 Volts D.C.—Modern.
- 2-GSC-5E Joy Shuttle Cars, Elevating Discharge, 4-Wheel Steering, 250 Volts D.C.
- 3-42E18 Joy Shuttle Cars, Disc Brakes, Elevating Discharge, Completely Modern, 250 Volts, D.C.
- 2-32 E-7 Joy Shuttle Cars.
- 1-10SC-2BPE Joy Shuttle Car, Permissible, equipped with 40J, 15 HP Motors.
- 1-10SC-2BPXE Joy Shuttle Car, Permissible, equipped with 40J, 15 HP Motors.
- 4-10SC Joy Shuttle Cars, 500 Volts D.C.

CUTTING MACHINES FOR SALE

- 2-29LC Jeffrey Cutting Machines, 250 Volts D.C.
- 1-512 CJ Goodman Cutting Machine, 50 H.P. with bullduster.
- 2-20R Joy Cutting Machines, 250 Volt D.C. with bullduster.
- 2-29UC Jeffrey Universal Cutters, Permissible, 250 Volts D.C.
- 1-512 CCH Goodman Cutting Machine, 250 Volts D.C.
- 5-358 Jeffrey Cutting Machines, 250 Volts D.C.
- 6-358BB Jeffrey Cutting Machines, 250 Volts D.C.
- 1-512DA Goodman Cutting Machine, 250 Volts D.C.
- 2-7AU Sullivan Cutting Machines, 250 Volts D.C.
- 3-212 AB Goodman Machines.
- 2-412 AA Goodman Machines.
- 6-35L Jeffrey Machine
- 1-11RU Joy Cutting Machine, 250 Volt D.C.
- 1-70-URB Jeffrey Cutting Machine, 250 Volts D.C.
- 2-512 EJH Goodman Cutting Machines.

CONTINUOUS MINERS FOR SALE

- 2-1CM Joy Continuous Miners, 250 Volts D.C.
- 3-4JCM Continuous Miners, 440 Volts A.C.
- 1-5 JCM Joy Continuous Miner with self-tramming and extensive belt, 440 Volt A.C. complete with 1000 feet of structure and belting with bridge conveyor between miner and belt.

RECTIFIERS FOR SALE

- 1-400 KW American Selenium Rectifier, 4160 Volts Primary, 275 Volts D.C.

ALL EQUIPMENT LISTED AND HUNDREDS OF OTHER ITEMS ARE IN STOCK AND MAY BE INSPECTED
AT OUR SHOP AND EQUIPMENT YARD LOCATED AT RALEIGH, WEST VIRGINIA

MOUNTAIN STATE EQUIPMENT COMPANY

Box 1050, Beckley, West Virginia

J. J. MAHONEY
Res. Phone Clifford 3-6804, Beckley

WILLIAM R. MONK
Res. Phone Clifford 3-6907, Beckley

Phone Clifford 3-7383

R. E. KAMM
Res. Phone 4281, Summersville

PROUD OF BEING "YES---MEN"

Whenever anyone asks us if we have latest type mining equipment such as loaders, cutters, shuttle cars, belt conveyors, substations, fans, tipplers, and including large quantities of all size of copper and rail, we always say "YES." We can furnish from a single item to a completely equipped large mechanized operation, and at fair prices ALWAYS!

We Buy — Sell — Trade

JOY EQUIPMENT—REBUILT

- 6—Joy 14BU 9AE—26" HI—New 1958.
- 3—Joy 14BU Loaders, low pedestal, 7AE, 1956 & 57.
- 6—Joy 14BU Loaders, medium pedestal, 7RBE.
- 1—Joy 14BU 7CE high pedestal loader.
- 4—Joy 14BU 3PE Loaders.
- 2—Joy 12BU Loaders complete with Piggybacks.
- 2—Joy 12BU Loaders, 9E, latest type, 250 V. DC.
- 5—Joy 12BU Loaders, 220/440 Volt AC.
- 1—Joy 20BU Loaders, latest type.
- 4—Joy 11BU Loaders, latest type.
- 1—Joy 8BU Loader, 34" overall height.
- 2—Joy 8BU Loaders, 220 V. AC.
- 1—Joy curved Bar Head for 14BU, complete.
- 6—Reliance 24-J Motors, 7½ H.P.
- 4—Reliance 38-J Motors, 10 H.P.
- 20—9-J Motors, 4 H.P.
- 2—Goodman 660 Loaders on Crawlers 440 V. AC, like new.
- 1—Goodman 660 Loader on Crawlers, excellent 250 V. DC.
- 1—Goodman 665 Loader on Crawlers, latest type 250 V. DC.
- 1—Goodman 865 Loader, 26" hi. Rebuilt. 250 V. DC.
- 4—Joy 8SC Shuttle Cars, rebuilt.
- 4—Joy 6SC Shuttle Cars, rebuilt, latest type.
- 1—Joy 5SC Shuttle Car, Excellent.
- 2—Joy 32E9 Shuttle Cars.
- 2—Joy 32E10 Shuttle Cars, rebuilt.
- 6—Joy 32E15 Shuttle Cars, rebuilt.
- 4—Joy 32E16 Shuttle Cars, rebuilt.
- 10—Joy 42E16 Shuttle Cars, rebuilt.
- 1—Joy CD-22 Drill, on rubber, like new.
- 6—Joy T-2-5 low pan Crawler Trucks, rebuilt.
- 1—Joy T-2-6 low pan Crawler Truck with reel.
- 2—Joy T-1 Standard Crawler Trucks, 220 AC.
- 1—Joy T-1 Standard Crawler Truck, 250 DC.
- 4—Joy 11-B Cutting Mach., like new, 35 & 50 H.P.
- 1—Joy 7-B Cutting Machine, like new, 250 V. DC.
- 2—Goodman 212 Cutting Machines, 19" high.
- 1—Goodman 312 Cutting Machine, 17" high.
- 3—Goodman 412 Cutting Machines, 19" high.
- 1—Goodman Machine on Crawler, 31" high. All hydraulic.
- 6—Goodman 512 Machines with Bugdusters.
- 6—Goodman 612 Cutting Machines, 250 and 500 volt.
- 1—Jeffrey 70 URB rubber tired Cutter, Universal head, perfect condition.
- 1—Goodman 2410 Rubber Tired Cutter, Universal head, like new.
- 3—Joy 11RU Rubber Tired Cutters with bugdusters, Universal heads, dual tires, like new, 250 V. DC.
- 2—Joy 10RU Rubber Tired Cutters, Universal head 220/440 V. A.C. Perfect.
- 4—Joy 10RU Rubber Tired Cutters, Universal head, 250 V. DC.
- 6—7AU's on track. Universal Head.
- 2—Jeffrey 29UC Cutting Machines, Universal head, cuts anywhere in seam, 38" high, on Crawlers, 250 volt D.C.
- 1—Jeffrey 29LC on Crawlers, rebuilt.

LOCOMOTIVES

- 1—Goodman 6 ton, 93-A, 27" high, armor plate frame.
- 1—Jeffrey 15 ton MH-77 Locomotive, armor plate frame.
- 3—Jeffrey, 13 ton, type MH-110, 36", 42", 44" ga.
- 2—Jeffrey, 10 ton, type MH-110, 42" and 44" ga.
- 2—Jeffrey, 10 ton, type MH-78, 42" and 44" ga.
- 2—Goodman 8-30 and 10-30 Locos, 26" above rail.
- 1—Jeffrey MH-121, 4 ton, like new, with reel, 24" overall height.
- 2—Jeffrey MH-150, 6 ton, 28" overall height, rebuilt, with reel.
- 12—Jeffrey, 6 ton, type MH-88, 42", 44" and 48" ga.
- 4—Jeffrey, 8 ton, type MH-100 2½" armor plate frames.
- 1—Jeffrey, 6 ton, type 218E, 22" above rail.
- 3—Jeffrey 6 ton, type MH-96, 42", 44", 48" ga.
- 1—G.E. 4 ton, type 825 Locomotive, 22" high.
- 10—G.E. 8 ton, type 801, 803, 821 Locomotives, 42", 44" and 48" ga.
- 1—G.E. 8 ton, type 822 Locomotive, 44" ga.
- 3—G.E. 10 ton, type 809 Locomotives, 42", 44" and 48" ga.
- 2—G.E. 13 ton, type 829 Locomotives, armor plate frames.
- 1—Goodman 91A Locomotive, 8 ton, 26" overall height.
- 2—Goodman, type 33, 6 ton, 44" and 48" ga.
- 3—Westinghouse, type 902, 4 ton, 42" and 48" ga.
- 2—Atlas Battery Locomotives 36" ga.
- 1—Atlas Trolley Locomotive, 4 ton, 24" high.
- 1—Ironton Battery Locomotive, 4 ton, 24" high, excellent, with charger.
- 2—Westinghouse, type 904, 6 ton, 44" and 48" ga.
- 2—Westinghouse, type 906, 44" and 48" ga.

TIPPLE EQUIPMENT

- 1—All Steel 5 Track Tipple, new 1957, complete with washer, silo, oil treating system, all bolted construction.
- 1—Complete Five Track Tipple with Washers and Air Tables.
- 1—Complete stoker plant, all steel.
- 2—Complete Tipples, 3 & 5 track, steel and weed.
- 3—Cleaning Plants, 1. Ea. McNally, Roberts and Schaefer, Jeffrey, Washers and Air-Flo Tables.
- 4—Complete Aerial Trams for coal or refuse
- 3—Complete Rope and Button Lines.
- 2—Monitor Lines complete with Drums, excellent.
- 1—Allis-Chalmers 5' x 12' Rippflo Vibrator.
- 1—Allis-Chalmers 4' x 12' Low-Head Vibrator.
- 1—Robins Gyrex Vibrator, 4 x 10.
- 10—Belt and Apron type Loading Booms.
- 6—Shaker Screens.
- 1—Robins Car Shakeout.
- 20—Crushers, various sizes—Jeffrey, McLanahan & McNally.
- 4—Mine Scales, 10 & 20 ton.
- 5—Truck Scales, 25 to 40 ton, late type.

Feeders, Belt and Drag Conveyors, Car Retarders.

CUTTING MACHINES

- 2—Joy 10RU Rubber Tired Cutters, Universal head 220/440 volt A.C. Perfect.
- 4—Joy 10RU Rubber Tired Cutters, Universal head, 250 V.D.C.
- 3—Joy 11RU Rubber Tired Cutters, 250 V.D.C.
- 1—Goodman 2410 Rubber Tired Cutter, Universal head, new 1956. Excellent.
- 2—Jeffrey 29UC Universal Machines on Crawlers.
- 1—Goodman on Crawlers, 31" overall height.
- 1—Baby Goodman 212's, rebuilt, 250 V.D.C.
- 7—Goodman 312 Cutting Machines, 19" high.
- 3—Goodman 312 Cutting Machines, 17" high.
- 6—Goodman 512's, with Bugdusters, like new.
- 6—Goodman 512's, rebuilt, or as removed from service.
- 6—Goodman 612's—250 & 500 Volt.
- 3—Goodman 112's, 220/440 V.D.C.
- 1—Joy 7-B Cutting Machine, 250 V.D.C.
- 4—Joy 11B Cutting Machines, rebuilt, 35 & 50 H.P.
- 6—7AU's, on track. Universal Head.
- 10—Goodman 12AA's and 112AA's, 250 V.D.C.
- 2—Goodman 324 Slabbers.
- 2—Goodman 724 Slabbers.
- 2—Goodman 824 Slabbers.
- 6—Jeffrey 35L's, like new, 250 V.D.C., 17" high.
- 2—Jeffrey 35L's, on low vein trucks.
- 2—Jeffrey 35L's, 220/440 A.C.
- 3—Jeffrey 35B8's, 220/440 A.C.
- 15—Jeffrey 35B8's and 35BB's 250 V.D.C.
- 2—Jeffrey 29's on track.
- 10—Jeffrey 29's, track mounted.
- 2—Jeffrey 29's, on Crawlers. Excellent.
- 1—Sullivan CE7, 220/440 V.A.C.

CONVEYORS

- 2—Goodman 97HC 30" & 36" Rope Belts. 1600' perfect. With or without rubber.
- 2—Jeffrey 52-B tandem drive 30' Belt Conveyors, 1,500'.
- 1—Jeffrey 52-B tandem drive 26' Belt Conveyor.
- 1—Joy 30' Underground Belt Conveyor. Excellent.
- 1—Goodman 97-C, 30' tandem drive.
- 1—Robins 36" tandem drive, with or without structure.
- 1,200' Robins 36" Underground Structure, like new.
- 1,000' Conveyor Belt, 42".
- 4,000' Conveyor Belt, 36".
- 3,000' Conveyor Belt, 30".
- 4,000' Conveyor Belt, 26".
- 8—Jeffrey 61AM 12' Chain Conveyors, 300'.
- 2—61EW Elevating Conveyors.
- 2—61WH 15' Room Conveyors, 300'.
- 2—Joy 15' Room Conveyors, 300'.
- 4—Joy 20' Conveyors, 300'.
- 4—Joy Ladel UN-15 Shakers.
- 1,000' Goodman 18" Flat Belt Conveyors, tandem drive any length, perfect.

CONVERTERS AND DIESEL PLANTS

- 1—300KW Portable Rectifier, 3 car unit, excellent.
- 2—500KW G.E. Stationary Rectifiers.
- 4—1,000KW Stationary Rectifiers.
- 2—100KW, G.E. TCC-6's, 275 V., Rotary Converters.
- 1—150KW, G.E. HCC-6, 275 V., Rotary Converter.
- 1—150KW, 6 phase, Allis-Chalmers Rotary Converter, 275 V. D.C.

We Own What We Advertise

J. T. FISH

PHONE PL 2-4400

LOGAN, WEST VA.

- 2—200KW G.E. HCC-6's, Rotary Converters, 275 V. D.C. Steel frames. Newly rewound.
- 3—300KW G.E. HCC-6's, Rotary Converters, 275 V. D.C. Like New.
- 2—300KW Westinghouse, 6 phase, Rotary Converters, 275 V. D.C.
- 2—500KW West Rotary Converters, 275 V. D.C.
- 2—200KW Westinghouse Rotary Converters, 275 V. D.C. Newly rewound.

(All the above with 8900/13000 and/or 2300/-4000 primary transformers)

- 2—100KW MG Sets, 275 V. D.C.
- 2—150KW MG Sets, G.E. and West, 275 V. D.C.
- 1—200KW MG Set, West, rebuilt, 275 V. D.C.
- 1—250KW MG Set, G.E., perfect, 275 V. D.C.
- 2—300KW G.E. MG Sets, like new.
- 1—300KW Westinghouse, 600 volt MG Set, rebuilt.
- 2—300KW Westinghouse, 600 volt, 6 phase, Rotary Converters.
- 2—500KW Westinghouse, 600 volt, D.C., 8 phase, Rotary Converters.
- 2—500KW HCC-6's, Rotary Converters, 6 phase, 600 V. D.C.
- 1—GMC-471 Diesel with 60KW, 250 V. D.C. Gen.
- 2—GMC-671 Diesels with 75KW, 250 V. D.C. Gen.
- 1—Cummins 125KW Diesel with 250 V. D.C. Gen.
- 1—Allis-Chalmers Natural Gas Engine with 100KW Generator, 275 V. D.C.
- Boilers, like new, 500 H.P.

LOADING MACHINES

- 16—Joy Loaders, 14BU, 12BU, 8BU, 11BU, 20BU.
- 5—Joy 12BU9E Loaders, 220/440 V. A.C. Excellent.
- 2—Joy 12BU with Piggyback Conveyors.
- 1—Joy 12BU on track. Universal.
- 1—Goodman 865 Loaders, 26" on Crawlers.
- 1—Goodman 120 Loader, on Crawlers, rebuilt.
- 2—Goodman 660 Loaders, 440 V. A.C., perfect.
- 1—Goodman 660 Loaders, on Crawlers, 250 V. D.C.
- 1—Goodman 460, on track, rebuilt all hydraulic.
- 2—Jeffrey 61 CLR's on rubber, 26".
- 3—Jeffrey L-500 Loaders.
- 2—Myers Whaley, No. 3 Automatic Loaders.
- 2—Clarkson Loaders, 26" above rail.

MISCELLANEOUS

- 150 tons Copper, 4/0 & 9 Section Trolley, 1/0, 2/0, 4/0 Stranded.
- 1—500MCM, 180MCM, 100MCM Bare & Insulated.
- 1 Each 4' 5" 6" & Hi-pressure Joy & Jeffrey latest type fans.
- 1—Complete Five Track Tipple with Washers and Air Tables.
- 5—Complete Tipples, 3 to 5 Track. Wood and Steel. Steel Trestles for drop bottom cars.
- All Steel Armclo Buildings.
- 20—Jeffrey Molyveors on rubber tires.
- 1—¾ Yard Shovel and Back-Hoe.
- 1—¼ Yard Crawler Crane.
- Battery Supply Tractors, Rubber Tired.
- 1—Centrifil Air Compressor on rubber tires.
- 10—Air Compressors, 1 H.P. to 40 H.P.
- 2—Joy self-propelled rubber tired comp., 240 cu. ft.
- 2—Acme self-propelled rubber tired compressors, 130 cu. ft.
- 40—Mine Pumps, all types.
- 1—Differential 40 Passenger Man-Trip Car.
- 6—MSA Rock Dusters.
- 2—Philip Carriers, 44" and 48" ga.
- 1—Barber-Greene self-propelled Bucket Elevator. Pipe, Plastic, Steel, Transit, all sizes 1" to 6".
- 300—Mine Cars, drop bottom, 42" ga.
- 90—Mine Cars, drop bottom, 44" ga.
- 50—Mine Cars, drop bottom, 48" ga.
- 100—Mine Cars, 18" high, end dump, 44" ga.
- 300—Mine Cars, end dump and drop bottom, 20" high, 48" ga.
- 10—10 ton Mine Car Scale with Recorder.
- 4—Brown Favro HBU, 500 V. latest type hoists.
- 15—Brown Favro HKL and HG Car Spotters.
- 1—Brown Favro Hydraulic Car Spotter.
- 1—12 ton Differential Scale Larry.
- Incline Hoists, 25 to 50 H.P.
- 1—Jeffrey 5' Aerodyne Fan, like new.
- 1—Jeffrey 6' Aerodyne Fan.
- 2—Storage Tanks, 4,000 Gallons.
- 2—Storage Tanks, 10,000 Gallons.
- 10,000 Five Gallon G.I. Cans, screw lids.
- 2,500 tons Reeling Rail, 25lb., 30lb., 40lb., 50lb., 60lb., 70lb.
- Thousands of feet of rubber covered three conductor cable, All sizes.
- 300—Transformers from 1 to 300 KVA, 110 to 30,000 primary volts.
- 400—Electric Motors, 3 to 250 H.P.
- Huge Stock of Mine Supplies.
- 600—MSA Mine Lamps, Chargers, etc.
- 4—Mine Scales, 10 & 20 ton.
- 5—Truck Scales, 25 to 40 ton, late type.
- Mack & International tandem dump trucks.
- THOUSANDS OF OTHER ITEMS

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THE FOLLOWING IS A PARTIAL LISTING OF EQUIPMENT FOR SALE AT THE MINE SITE

Shuttle Cars, 250 Volts DC

11—Joy 10SC Shuttle Cars, right and left hand drive.
3—Joy 42-D Battery Shuttle Cars complete with batteries and chargers.

Cutting Machines, 250 Volts DC

5—10RU Joy Cutting Machines
5—324 AA Goodman Slabbers—Track Gauge 42"

Trolley Locomotives, 42" Track Gauge for 250 Volts DC

2—Goodman 20 ton 81A42-108T with 3—120 H.P. Motors, completely modern.
1—13 ton Goodman—Type 81A04T, completely modern.
1—Goodman 13 ton 136B-0-4-6 with 2—75 H.P. Motors.
2—13 ton Jeffrey Locomotives, (1—inside frame and 1—outside frame)
1—Goodman 5 ton 3013 with 1—50 H.P. Motor.
4—8 ton 132AK42-48R Goodman with 2—50 H.P. Motors with reels.
1—8 ton 32-0-4-T Goodman with 2—50 H.P. Motors with reels.
1—8 ton LM2-8-T-2D General Electric with 2—50 H.P. Motors with reels.
3—6 ton LM2-T-6MM General Electric with 2—35 H.P. Motors with reels.
2—6 ton LM2-4-6-11 General Electric with 2—35 H.P. Motors with reels.

BATTERY LOCOMOTIVES, 42" Track Gauge

18—Greensburg Monitors complete with charging equipment and batteries.
8—Mancha Locomotives complete with charging equipment and batteries.

Loading Machines, 250 Volts DC

9—11BU Joy Loading Machines, completely modern with separate pump motors.
6—360 Goodman Loading Machines.

Motor Generator Sets

8—General Electric 300 KW Motor Generator Set, 1200 RPM, primary voltage 2300/4160, 275 Volts DC Complete with panel boards.
5—General Electric 200 KW Motor Generator Sets, 1200 RPM, 2300/4160 primary voltage, 275 primary voltage 2300/4160, 1200 RPM, 275 Volts DC Complete with panel boards.
3—Westinghouse 200 KW Motor Generator Sets, 1200 RPM, 2300/4160 primary voltage, 275 Volts DC, complete with panel boards.
3—Westinghouse 150 KW Motor Generator Sets, 1200 RPM, 2300/4160 primary voltage, 275 Volts DC, complete with panel boards.

Conveyors

5—Joy PL 11 Elevating Conveyors
6—Joy PL 11 Side Dumps

Belt Conveyors

1—Hewitt Robins Slope Conveyor, 980 ft. long, 42" wide, equipped with 200 H.P., 440 Volt AC Drive (also 50 H.P. Volt AC Motor for man trip), complete with 42" x 6" ply Rubber Conveyor Belt, Ajax Raynile #130/4" top cover and 1/16" bottom cover with Nylon Breaker.
3,128 feet of Jeffrey 36" wide structure in 8 ft. sections.
2,296 feet of Joy 36" wide structure in 8 ft. sections.
10,848 feet of Rubber Belt 36" wide.
3—40 H.P. Goodman 36" Belt Drives with Tail, 250 Volts DC.
1—Robins Belt Conveyor 36" wide, 150 ft. long complete with Allis Chalmers, 30 H.P., 220/440 Volt AC Drive.

MINE CARS

100—AC&F, Three-Door Drop Bottom Mine Cars, 48" High, 17 ft. 7 1/4 in. overall length, capacity 271 cubic feet level full, 42" gauge.
100—Sanford Day Three-Door Drop Bottom Mine Cars, 36" High with an 8" sideboard, 16 ft. 10 1/2" overall length, 42" gauge.

WIRE MATERIAL

21,400 ft.—4/0 Round Return Wire
8,600 ft.—500,000 CM
50,000 ft.—1,000,000 CM
82,600 ft.—6/0 Trolley Wire
8,000 ft.—4/0 Rubber Covered 4000 Volt Feeder Cable.

TRACK MATERIAL

64,800 ft.—40# Track
154—40# Switches
10,800—40# Ties
100,400 ft.—50# Track
51—60# Switches
7,000—60# Ties

COMPLETE FOUR-TRACK TIPPLE CAPABLE OF HANDLING 10,000 TONS OF COAL PER DAY

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CMI 48" Dryer—complete with motors, drives, belt, etc. screen cloth 1/16" opening, capacity 90 ton per hour.
1—Corpus Ventair Blower #24708.
Pulverizers: (American Pulverizers) 4—#305, Ser. #3218—AC3, Serial #1798, AC3B, Ser. #3127, WC-24, Ser. #3240.
5—8x6 Allis-Chalmers Centrifugal Pumps, complete with motors (4) breakers.
1—16x14 Allis-Chalmers Centrifugal Pump, complete with motor, starter, breakers.
1—Roberts & Schaefer Elec. Vibrator.
Consists of Belt & Chain Conveyors complete with motors, drives, 36" Belt also some 24x30" Belt.
1—Roberts & Schaefer Air Drying Plant (specifications furnished on request)

WELDERS

3—Lincoln, 300 amp. M.G. Sets
2—Hobart 300 Amp. M.G. Sets
1—G.E. 400 amp. M.G. Set
4—Guyan 200 amp. Resistance Welders

AUTOMATIC RECLOSEING BREAKERS

4—1600 amp. I.T.E. Modern with reverse current relay.

ARDOX EQUIPMENT

5—Armstrong 60 H.P., AC 440 Volt Compressors
5—Armstrong Coal Breakers, Model EB-301.
5—G. E. Motors 60 H.P. Type K, Frame 504, 220/440 Volt AC, 1180 RPM.
Auxiliary equipment and controls complete with 16,100 feet of Ardox Pipe.

PORTEFEEDER

1—Nolan Portafeeder.

COAL DRILLS

5—Manson Trucks—10 H.P., DC Tram Motors on 4, 7 1/2 H.P. DC Tram Motors on 1, Joy 9 J Motor with Reduction on 1. Each drill truck has 2 drill arms with 2 Chicago Pneumatic 580 Drills 7 1/2 H.P., DC.
3—Manson Track Trucks, each truck with 2 drill arms & 2,580 Drills.
2—Manson Track Trucks, without drills.
9—Dooley Rubber Tired Drill Trucks, equipped with two arms and two 580 drill motors.

ROOF DRILLS

1—Joy RBD-7 with 15 HP Reliance Permissible DC and mounted on Manson with 7 1/2 H.P. Westinghouse on Rubber.
1—Jeffrey 56 R.D. with 15 H.P. Motor DC, arm is mounted on Manson Track Truck.
1—Dooley (Rubber Tired) Drill Truck, equipped with Vertical Drilling 580 Drill Motors.

ROCK DUSTERS

1—American Mine Door Road Cleaner
2—MSA Rock Dusters, 25 H.P. Track
3—MSA Bantam Rock Dusters, 2 H.P.

TRUCKS

4—(Shop Built) Mobile Repair Trucks
4—Personnel Jeeps, 42" Track Gauge.

FANS

2—Jeffrey Aerodyne Fan, Serial No. 8687 complete with G. E. 100 H.P. 440 Volt AC Motor and Auxiliary Ford Industrial Power Unit gasoline driven.
1—4 ft. Jeffrey Aerodyne Fan complete with 60 H.P. 220/440 Volt AC Motor and Auxiliary Ford Industrial Power Unit gasoline driven, complete with all necessary equipment and controls.

TRANSFORMERS

3—2400/4160 Y, 240-480 Volts, 100 KVA General Electric Single Phase Transformers.
3—2400/4160 Y, 240-480 Volts, 333 KVA General Electric Single Phase Transformers.
3—2300/4160 Y, 230-115 Volts, 200 KVA General Electric Single Phase Transformers.
3—2300/115/230 Volt, 15 KVA General Electric Single Phase Transformers.
5—50 KVA, 2300/4160 Y, 240/480 Volt General Electric Single Phase Transformers.

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Complete inventory of new parts for 10SC, 10RU and 11BU Joy Equipment plus cable, tools, hardware, etc. for operation of mine.

BATHHOUSE EQUIPMENT

35—Baskets with Chains, 20 shower heads and complete equipment for operation of bathhouse.

LAMP HOUSE

360—R4 Cap Lamps complete with necessary charging equipment.
25—Flame Safety Lamps

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1—Shovel Digger Stock for same—Size 301, Serial No. 61, Length 16 feet—3 1/4 yard dipper.
1—Hais Field Loader, Model 75WSBC, Serial No. 726, 11' 6" Conveyor, Serial No. K8644.
1—International 1950 Flat Bed Truck Tandem with steel bed and wench, Ser. #3438, 3 axles, weight 18,500 lbs.
1—Haugh Pay Loader, Model HF and HFH, Serial No. 81221.
1—Allis Chalmers Tractor HD-827
1—Allis Chalmers Tractor Hi Lift, Model HDS, Serial #24/2482, Serial No. 22246.
1—Caterpillar Tractor D6, 50" Gauge, Serial No. 584778.
1—Whiting Track Mobile, Serial #TM-209.
1—Roller—W. M. Bros. Boiler Mfg. Co., Model 678, Serial #RR-2734, weight 3950 lbs.

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100	Wes. S.B. Open	SK-170	900
100	CW TEFC BB	S3 HFC	900
75	Burke BB Drip	WA-6	1800
75	Wes. S.B. Open	SK-140L	1800
75	Wes. S.B. Open	SK-160	900
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BLASTING IS OUT— D9 AND RIPPER IN— PRODUCTION

UP 35%

Gillen Coal Mining, Inc., is salvaging a six-ft.-thick seam of coal near Carbondale, Pa. To get to the coal, 180 ft. of overburden must be removed—10 ft. of topsoil, 100 ft. of hardpan and, finally, 70 ft. of rock.

Gillen used to blast through. Then they changed to a Caterpillar D9 Series E Tractor with a No. 9 Ripper. Production shot up 35%. Cost savings are estimated to be 60%!

The overburden, rough as it is to work with, is the kind of material the D9 and No. 9 Ripper eat up. Working in 50-ft. passes, the team fragments the hardpan (average cu. yd. weight 3200 lb.) into right-size pieces for two Cat DW21s. They're moving up to 4000 yd. a seven-hour shift. When needed, the D9 pushloads the scrapers and 'dozes, too.

The D9 and No. 9 is an all-business combination of power and speed. The Series E Model D9 has a 335 HP (flywheel) turbocharged engine to put massive power into the work. You get more power from every gallon of fuel. The Series E D9 has a heavier undercarriage. Track components are bigger, heavier. You get up to 40% more

life with deeper hardened steel shoes, links and rollers. A new equalizer bar makes the Series E D9 even more stable.

New power shift transmission gives you the flexibility and anti-stall features of a torque converter with the split-second snap of direct drive. Finger-tip control gives operators instant changes under full load without clutching.

Match this with the No. 9 Ripper to break your way through production bottlenecks. For the right tractor-ripper combination, see your Caterpillar Dealer, who will prove his recommendation with a demonstration.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

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